COAL AGE

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Mr. Mine Owner and Mr. Mine Manager.

Do you give your employees all to which they are justly entitled? By this is not meant the actual dollars and cents they draw on payday, but do you give them value received for the rent they pay? Are their houses shacks built from mill culls, without paint, without a fence, without a garden or yard, without any sanitation, with a leaky roof and a chimney that will not draw? Or are your houses neat little cottages, painted, with a fence, a garden, a bath and water?

Perhaps you say that the average miner will not appreciate the little cottage, and that the bathtub would soon become the storage place for all kinds of rubbish. Perhaps in a way you are right, but if you can elevate the average miner to the point of appreciating his home, with its pleasant surroundings, you will surely find that you have a better employee; and as you raise the standard of life for one miner, you have thereby raised the standard of your camp.

Do you make 50 per cent. profit in the company store, or are you satisfied with 10? Are you like the mine manager who remarked—"We will do all right this year, as we are getting the coal on the railroad cars for the same money at which it is sold, and we can declare a good dividend from the profits of the store and the rents." The houses of this company were mere shacks, yet they rented for $5 per month per room; the nearest competitor of the company store was four miles away over practically impassable wagon roads.

Do your employees respect you as an individual, or because you are the boss? Are you and your men proud of your camp and mine? Do you put dollars, or safety first? As the mine owner or manager, you are a personage in your community and this gives you many privileges, as well as many duties. Do you abuse the privileges? Do you recognize your duties?

Mr. Employee:—

Do you give the company full value for your pay? Do you aid them to the best of your ability? Do you obey all rules and regulations that are made for your safety? Do you appreciate the trim little cottage, with its garden and bright surroundings? Do you help the company to make the camp and the mine the best in the field?

Are you loyal to the company? Do you protect its interests? Do you ever try to aid its owners even though this means a little extra work for you? Or do you scheme to get a 15-min. delay in reaching the parting with your loads, so you will not have to make the last trip? Do you kill time when the boss is not around, or do you work at the same rate as when he is standing over you?

Do you only look forward to payday, and the sound of the whistle, or are you proud of your work and anxious and willing to earn your pay? Do you save the extra spikes and bolts, or do you throw them away because there are plenty more in the supply house? Do you bring out the extra timber, or do you hide it behind the gob?

Have you always been square in your dealings with the company? Or, are you like this miner: He had an entry under contract; it was in low coal and the rock was paid for at $2 per yd. The bank boss left his paint at the mouth of the entry and did not put up any yardage stamp; the next month the entryman devoted all his time to pushing his rooms while he only drove the entry 8 ft. A new bank boss came on, and when he measured up the yardage he used the last stamp of the previous boss and gave the entryman 69 ft. Did the miner correct this mistake? No sir, he took the $46 with a grin, and as an excuse said—"It was the company's fault, and anyway they have beat me out of more than that in the store."

To Both Employer and Employee:—

It is probable that ideal relations between you two will never be fully realized. However, is it not possible to better the conditions that now exist? The company by taking more interest in the individual will cause him to realize that his efforts are appreciated, while the employee on his part can be more loyal to the company, and by carefully obeying its rules can help preserve the employer's property. Let us revert to first principles—"Do unto others as you would be done by," instead of doing others before they do you.

Ash- and Coal-Handling Equipments

By Henry J. Edsall*

SYNOPSIS—Although the pivoted bucket carrier is higher in first cost, the operating and maintenance charges are so low that this style of conveyor shows the best results through a long period of service. For storage, a "Dodge" system is best for sized anthracite, and a locomotive crane or a traveling-bridge tramway is best for run-of-mine bituminous. The second and concluding article on the subject.

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A coal-handling equipment supplied with a pivoted bucket carrier system is, of course, designed only for a small plant. As a rule, a first-class pivoted bucket carrier for handling both the coal and ashes is the simplest and best arrangement, and works out to be the cheapest in the end. While it may be somewhat more expensive in first cost, the operating and maintenance costs are so low and there are so few delays that run into expense so quickly, that the carrier shows the best results when followed through a long period of service. There is, however, a great difference in pivoted bucket carriers, as there is in all machinery, and to get good results, it is necessary to select a carrier that is carefully designed and one in which the materials and construction are of the best.

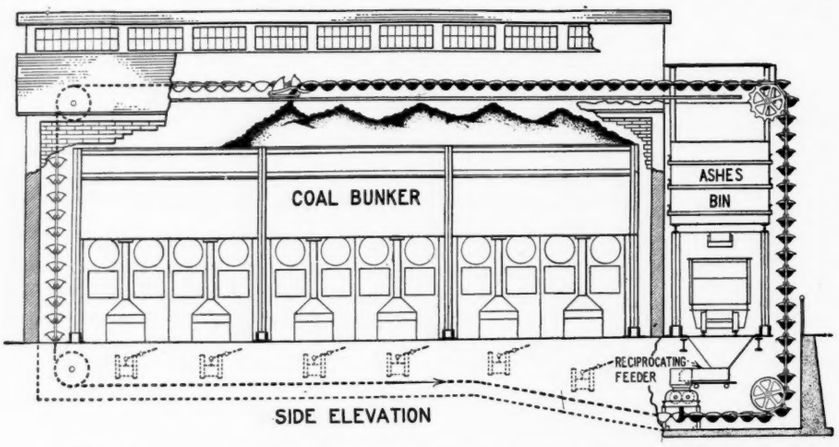

Fig. 1. Boiler Room Equipped with Conveyor Handling Coal and Ashes

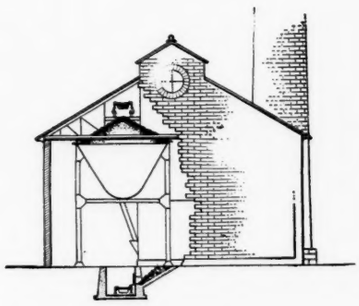

Fig. 2.

Figs. 1 and 2 show a boiler room equipped with mechanical stokers and overhead coal and ash bins and with a pivoted bucket carrier for handling the coal and ashes. The coal is fed from the track hopper to a crusher by means of a reciprocating feeder. After passing through the crusher it goes directly into the carrier buckets which elevate it and convey it to the bin where a movable dumper can be set to dump the coal from the buckets at any point. The coal then feeds by gravity from the bin through the stoker spouts to the mechanical stokers. The ashes go into hoppers underneath the furnaces and are then fed by gravity or raked out into the carrier buckets, which take them up and deliver them to the ashes bin for discharging to railroad cars or carts.

Fig. 7 shows a bin in a boiler room with spouts direct to stokers, and Fig. 4 shows a bin with a traveling weighing hopper underneath so that the coal can be weighed before it is delivered to the stokers. Fig. 5 shows an elevated ashes bin built with concrete columns and floor, brick walls, and corrugated-iron roof. This makes a practically permanent construction, whereas a steel bin is subject to more or less corrosion from the sulphuric acid formed by the action of the water used in quenching the ashes. This corrosive action is also quite serious where steel is used for the buckets and chain in the carrier. Malleable iron, however, is much less subject to corrosion and stands up remarkably well, and by using case-hardened steel pins and bushings with large bearing surfaces at the chain joints and large well oiled rollers, a very durable carrier can be obtained.

Comparison between Belts and Elevators

The earlier carriers for handling coal and ashes, like first designs in most kinds of machinery, were not very satisfactory because the ashes and acid quenching-water cut and corroded them so rapidly. This has prejudiced many people against handling coal and ashes in one carrier, and as a result, separate systems for each are very popular with many engineers. This means two systems to install, operate and maintain, and the cost for each of these three items is usually higher than with the best modern carriers. The coal handling usually consists of a chain and bucket elevator or inclined flight conveyor or belt conveyor for elevating the coal, and a flight or belt conveyor for distributing. For ordinary capacities, flight conveyors are cheaper to install and, contrary to the ideas of many engineers, cheaper to maintain than belt conveyors. Distributing with a flight conveyor also requires only simple slide gates, whereas the belt conveyor requires the more expensive tripper and a track for it to run on. For long conveyors or very large capacities, the belts show a considerable saving in power and, on account of the higher speed, the handling capacity is much higher for a similar width. For moderate lengths and capacities, however, the saving in power is a very small item, and, as stated before, the flight conveyor is cheaper in first cost and cheaper to maintain. There is also some danger with a belt conveyor of having the belt badly torn by a sharp

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piece of steel or other foreign substance in the coal. When this happens, it is expensive, as the belt itself forms the principal item of cost in a belt conveyor.

For handling ashes in a small plant, the usual equipment is a wheelbarrow or industrial car for moving them horizontally, and a chain and bucket elevator or skip and cable hoist for elevating them. They can be either delivered to an overhead bin for gravity loading to wagons or cars, or delivered direct to the wagons or cars, or to a ground storage pile. The vertical chain and bucket elevator is a satisfactory type of machine for moderate capacities and moderate heights, if properly designed and constructed, but for large capacities or greater lifts, the skip hoist shows a lower maintenance cost. A pivoted bucket carrier will, of course, do the horizontal conveying and also the elevating with one machine, and will do this with a minimum amount of repairs, but the first cost is too great for small plants. Another type of conveyor that has proved economical for conveying ashes horizontally, or at an incline, is a block chain conveyor. This type of machine consists of a block chain, 8 or 12 in. wide, that slides along and pushes the ashes forward in a cast-iron trough. The only wearing parts are the chain, wheels, trough and return guides. The trough and return guides

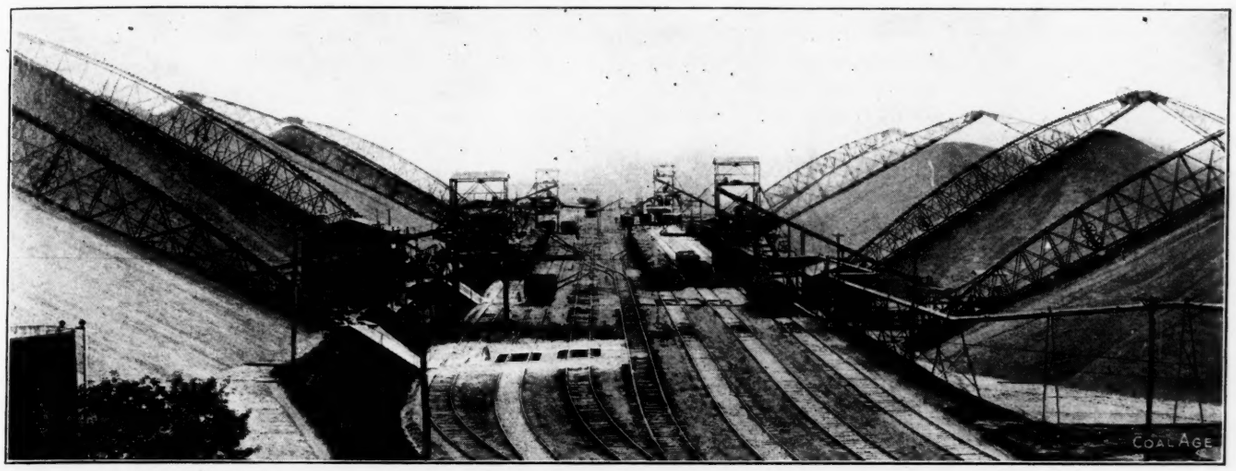


FIG. 3. A LARGE STORAGE PLANT USING THE DODGE SYSTEM

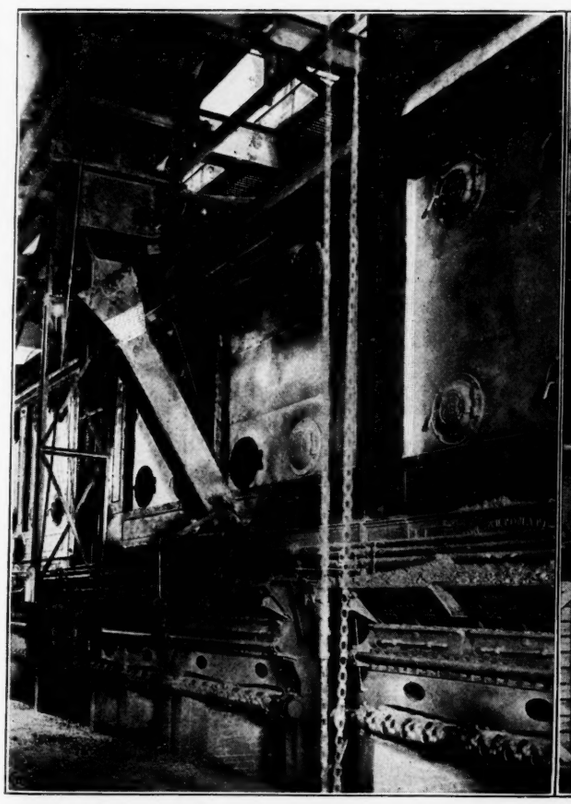


FIG. 4. TRAVELING WEIGHING HOPPER DELIVERING COAL TO STOKERS

FIG. 5. ELEVATED BRICK ASH BIN BUILT OUTSIDE OF MAIN PLANT

can be made quite thick so that they will wear for a long time, and the chain and wheels can be renewed without great expense even if they do not last for such a great length of time.

Pneumatic System for Handling Ashes

Recently, pneumatic systems have been developed for handling ashes and have even been used for handling both coal and ashes. One of the heaviest items of expense with such a system is the power cost, for a great deal of power is required in any blowing system. In handling a small amount of ashes per day, this is not a serious matter, but where a large amount of coal and considerable ashes also are to be handled, it becomes quite an important factor. It is also necessary to feed them slowly and regularly, and the coal or ashes must be quite dry or they will stick in the pipes. In feeding ashes they are usually raked out to openings in the floor, or fed from hoppers underneath the boilers, and the operation is much slower than with a pivoted bucket carrier that ordinarily handles 40 or 50 tons per hour or more. The pneumatic system therefore requires not only a larger motor, but a longer period of operation to handle the same amount of material. Where a pivoted bucket carrier would require a 7½-hp. motor for operation, a pneumatic system would require about a 40- or 50-hp. motor. This means much higher cost of operation. The principal claim for pneumatic systems is low maintenance costs, but this does not seem to be borne out by actual results. Certain parts wear out quite rapidly, especially the pipe elbows at bends, even though special steel wearing faces are provided. In handling coal there is also trouble caused by its being pulverized by striking the bends at high velocity, and this causes it to fall through the grates and work badly in the furnaces, thereby reducing the efficiency.

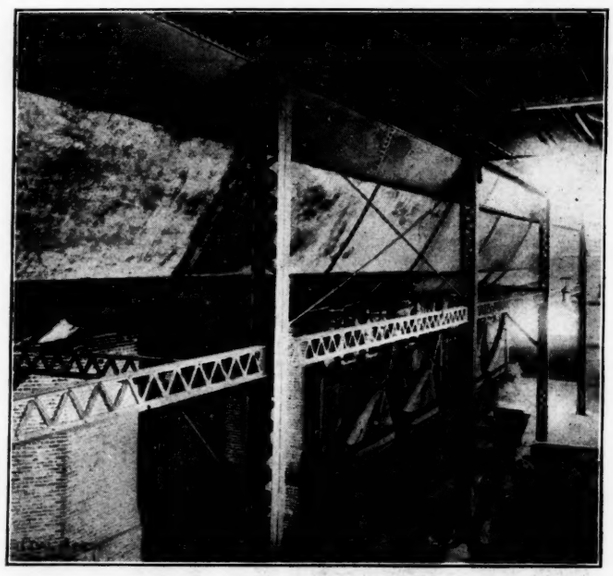


Fig. 7. Overhead Bin for Mechanical Stokers

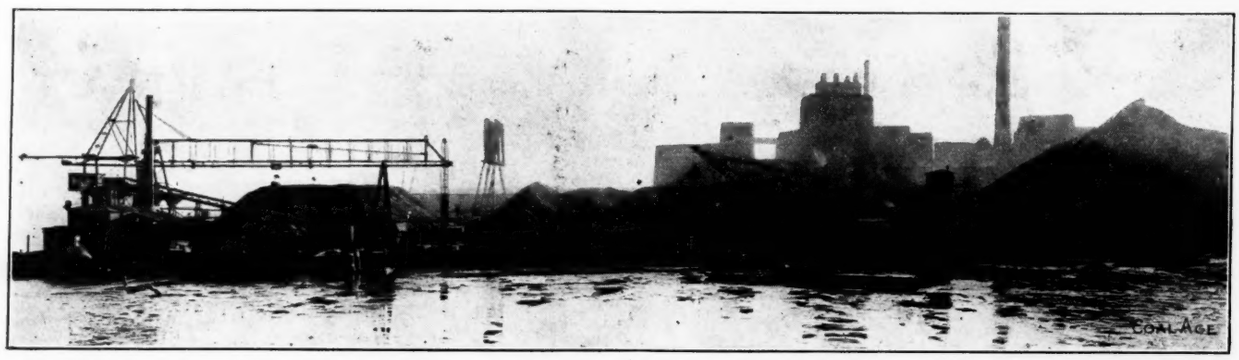


Fig. 6. A Coal-Storage Plant Using Three Types of Equipment

In very large power houses, electric ash cars are sometimes run in under the ash hoppers below the furnaces and the ashes delivered to them to be taken out and elevated to an overhead bin or disposed of in some other manner.

Reserve Coal Storage

Reserve storage plants are sometimes placed adjacent to a boiler room so that the coal can be reclaimed by mechanical means and delivered to a bin in the boiler room, or under the boiler-room floor. In other cases the storage plant is placed at some distance from the boiler room and the coal transferred by cars or other means. Attention has already been called to the scheme of using a simple chain and bucket elevator, inclined flight conveyor, or elevator and conveyor for unloading the cars, and piling on the ground and also to the use of the tub hoist or clamshell-bucket hoist for unloading boats, and the automatic or cable railway for distributing in a ground storage pile. A more flexible arrangement is a locomotive crane equipped with a clamshell bucket. With such a machine operating on a track on the wharf, coal can be taken from the boat and piled in a long pile directly back of the track, or it can be handled from the boat or the storage pile to a car or cars which can be pushed with the crane to the boiler room, and then handled with a conveyor equipment, or in some cases the coal can be delivered direct to a conveyor system, which extends down to the wharf. In many cases locomotive cranes can also be used to advantage for handling ashes from pits or a pile on the ground to cars or carts. In many instances locomotive cranes are used to transfer coal from boats either to a storage pile along the wharf, or to a hopper which feeds an inclined flight conveyor extending to the boiler room. An 8-ton car is also used for handling the coal from the pile to the conveyor when taking it from some distance from the conveyor-feeding hopper.

The Dodge System of Storing Coal

For very large reserve storage plants, the "Dodge" system is usually by far the best for sized anthracite coal, and for run-of-mine soft coal either a locomotive crane

with a long boom or a rotating or traveling bridge tramway.

The "Dodge" system has two inclined trusses attached together at the peak and having a flight conveyor running up one of them. The coal is fed from the railroad cars through a track hopper to the inclined conveyor which piles it on the ground in a conical pile of usually from 30,000 to 60,000 tons. Two of these piles and a reloader form a unit. The reloader is a flight conveyor which swings around on circular tracks at the ground level so as to cover practically all the area of the two conical coal piles. This reloader is swung against the side of the pile so that the flights can get hold of the coal and push it back and up an incline to the railroad cars. At the plant shown in Fig. 3, 14,400 tons of coal can be handled from the cars to the pile, and 10,000 tons back again from the pile to the cars in 10 hours, at a total cost of less than three cents per ton.

In storing soft coal it is necessary to spread it out over a large area and pile it not over 20 or 25 ft. deep on account of the danger of spontaneous combustion. A clamshell bucket traveling back and forth on a bridge tramway will form a pile over the whole area covered by the bridge, and the bucket can be used for handling to the pile or taking out of storage. If the bridge revolves around a central pivot point, it forms a circular pile, or rather two semicircular piles, for it is necessary to leave a cut through the center for the railroad cars to reach the central unloading pit. If the bridge travels lengthwise, a rectangular pile is formed. The trolleys that run back and forth on the bridge and carry the buckets, are either operated by wire ropes from one end of the bridge, or else the trolley has its own motor and the operator rides along with it in a cab. The first arrangement usually works out best, unless the length of the bridge is too great for satisfactory control and operation.

A large-radius locomotive crane can be used to form circular piles similar to the revolving bridge tramway, or it can be used for almost any shape of pile which fits into the conditions. It is the most flexible and cheapest machine in first cost, and by extending the tracks for it to run on, the amount of storage obtainable can be extended indefinitely. A 100-ft. radius crane with a five-ton bucket will handle over 200 tons per hour with ease.

Fig. 6 shows a modern reserve storage plant belonging to a large electric company. In this plant the "Dodge" system for storing anthracite is used and there are also a locomotive crane and a bridge tramway for loading and unloading soft coal, three types being shown.

Miner Receives $37,500

What is said to be the largest verdict ever given in a personal-injury case in the United States Circuit Court was handed down by Judge Chalfield, in New York, recently, when Stanislaw Yensavage, a miner, was awarded $37,500 for injuries suffered while in the employ of the Lehigh Coal Co., at Shenandoah, Penn.

On June 10, 1911, Yensavage was working as a helper in the company's mines. While carrying percussion caps his oil lamp ignited one of them. An explosion followed, causing the loss of both eyes, his right arm and all but the index finger and thumb on his left hand. He was in the hospital five months. He sued for $50,000. The jury was out only three minutes.

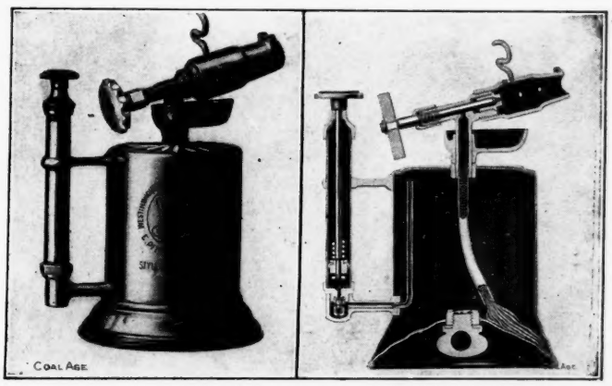
A Universal Blow Torch

A new gasoline blow torch has recently been placed on the market by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Penn., which embodies a number of novel features and improvements. These, it is claimed, adapt the instrument for all conditions of service and it is, therefore, called a "Universal" blow torch.

The burner is made particularly heavy so that it will retain its heat and keep the torch burning in cold or windy weather. The drip cup is made especially deep so that it will start operation under bad weather conditions. These features, however, do not detract from the use of the tool for indoor work.

Another feature of the torch is the self-cleaning burner valve. The needle at the end of the valve stem cleans the hole automatically when the handle is turned. The valve seat need, therefore, never be injured by picking at the opening to clean it. The valve seat, furthermore, is a separate replaceable plug.

The handle of the valve is of fiber and does not get hot nor does it need a long valve stem for cooling as does one made of iron. On the other hand, it will not crack, loosen and come off as does a wooden handle nor does it char or burn.



GENERAL AND SECTIONAL VIEW OF UNIVERSAL TORCH

The tank, it is claimed, is of the heaviest gage brass ever used for such a purpose and is reinforced with an extra corrugated brass disk covering the entire inner surface of the tank pot. This insures the receptacle keeping its shape under rough handling.

The pump valve works in a cylindrical guide which assures perfect seating. It can be taken down and any part replaced separately.

COMING SOCIETY MEETINGS

Alabama Coal Operators' Association—This association will hold its annual meeting at Pine Tank, on July 26.

American Institute of Mining Engineers—This institute holds its next annual meeting at Butte, Mont., on Aug. 18 to 21, inclusive. Bradley Stoughton, 29 W. 39th St., New York City, is secretary.

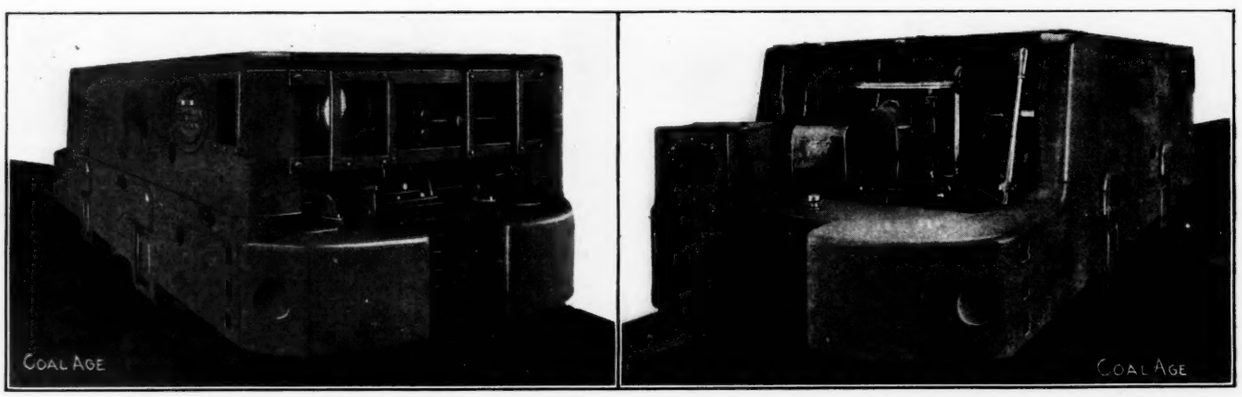
National Conservation Exposition—Miners' Field Day, to be held under the auspices of the Tennessee Mine Foremens Association, with the coöperation of the Bureau of Mines and the American Red Cross, on Sept. 20, at Knoxville, Tenn.

The History of the Gasoline Mine Motor

By R. O. Hodges*

SYNOPSIS—The gasoline mine motor was designed to fill particular needs of the coal industry. The author shows what these are and gives a description of the early attempts to produce a locomotive to meet the requirements. An article next week will answer some of the objections hitherto brought against the gasoline motor.

There are many places today where the mule still furnishes the most economical form of haulage. The original investment is not large; the system possesses great flexibility, and is, perhaps, more widely understood than any other. I have often been astonished at the ability shown by the mine mule to haul, for short distances, enormous loads, over any kind of track, despite improper treatment. But the mine mule's average pace is not greatly in excess of three miles per hour, and the mileage which he can cover in the course of a day is decidedly limited. The mule is also constantly liable to injury and is a menace to everyone in the mine.



Front and Rear Views of Whitcomb Gasoline Locomotive

Steam Locomotives

Underground steam locomotives were much in vogue at one time in the anthracite region, and also to some extent in Virginia and West Virginia. They were also used to some extent in Europe. They could not be used without a tremendous amount of ventilation in the entry through which they worked, both on account of the steam which made the heading hot and the lights obscure and because of the immense volume of smoke and the incompleteness of the combustion. The large quantity of carbon monoxide and carbon dioxide given off by the combustion of a ton of coal, readily explains why the mining departments in most of the states have strenuously objected to steam locomotives being introduced into mines, although for cheapness of running and flexibility they leave nothing to be desired.

Compressed-Air Haulage

Compressed air holds a field today, from which I believe it will never be displaced. In deep and gassy mines, compressed-air must of necessity always be the preferred haulage. It operates entirely without sparks or flame of any kind and instead of detracting from the ventilation, it adds to the air-current a perceptible quota of clean and cool air. On the other hand, compressed-air motors are exceedingly bulky and require wide and high entries in which to operate. Their flexibility is strictly limited by the fact that they can, comparatively speaking, proceed but a short distance away from the charging station. The first cost of the compressed-air haulage plant is equal to, or probably in excess of the first cost of an electric installation.

While it is perfectly true that the efficiency of a compressed-air plant can be made nearly, if not quite, equal to the efficiency of the electric plant, mining conditions are such that this efficiency is rarely, if ever, realized, and as at present installed, it is probably the most expensive in fuel of any system of mechanical haulage. The difficulties in keeping pipe lines absolutely tight when the air pressure is 1000 lb. are very great. Unless pipe lines, the piston rings in compressors, and pistons in the air motors are kept in excellent condition, the air which has cost so much coal to compress will escape in abnormal quantities.

The Electric Motor

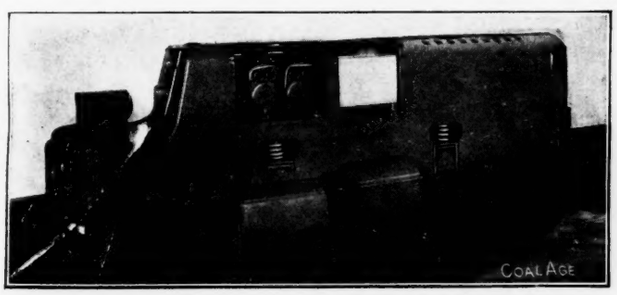
I once saw a statement, made by Mr. Edison, I think, in regard to electricity, which I believe largely accounts for its popularity in many lines. He stated that to produce mechanical power with an electrical current only one single, simple, rotating member was necessary. This is strictly true, and mechanically considered the electric motor is the simplest machine of which we know. There is nothing needed except one drum with its windings rotating at a greater or less speed between the poles of two or more magnets, and we only have to introduce some gearing of the simplest possible form between this rotating drum and the wheels of a mine motor to obtain the power necessary to pull the mine cars. Mechanically there is nothing to get out of order, and as long as we can keep electricity passing and nothing burns out, the motor is bound to keep on pulling coal.

*Mechanical engineer, Geo. D. Whitcomb Co., Rochelle, Ill.
Note—Article read before West Virginia Coal Mining Institute, June 24, 1913, at Morgantown, W. Va.

It is a little hard to criticize a system of haulage which has proved, by long experience, to be such a monumental success, but it is not without its disadvantages. Methane is lighter than air, and a trolley wheel moving along a conductor is about the most perfect means for the ignition of gas. If we could get one-half as good a spark or flame in the cylinders of our motors as is obtained from the ordinary mine trolley, what few ignition troubles we have would entirely cease. These sparks from the trolley wire seem to me to exclude the electric motor from any place in which there is the least danger of gas being present in explosive quantities.

Excessive Starting Torque

Some years ago I was frequently in the granite quarries of New England and I noted numerous attempts made to install electricity as a hoisting power on the large derricks by which the stones were lifted. The system never was a success for this one reason: In starting the big blocks of stone out of their beds it was necessary to put a strain on the rope and then loosen the rock with wedges and crowbars until finally it would break away and swing out. The electric motor, if it cannot move, must either blow a fuse or else burn up. Much the same difficulty is found in its application to mining conditions. If it is over-loaded, it gets very hot and either blows a fuse or



Side View with Doors Removed for Inspection of Engine and Refilling of Gasoline Tank

burns out; and as you all doubtless know, when the electric motor is finally burned out, it is an expensive job to put it in condition for further service.

Large First Cost of Electric Haulage

The initial investment for a properly installed electric plant is heavy. Not only the electric motor, but trolley and feeder wires have to be furnished and erected at no small cost. Moreover the rails have to be bonded to carry the return current. All these items are by no means to be despised. The cost of preparing track for electric use is generally more than for any other systems, as in addition to trolley wire, rail bonding, etc., the track itself has to be carefully lined up with the conductor if the trolley is to be kept on the wire. Also in mines with a bad roof the cost of erecting and maintaining trolley hangers is considerable. I have not spoken of the initial expense of installing an electric plant, of the necessity for dynamos, engines and boilers but these are a very real part of the expense of an electric installation and even if the electricity is used for cutting coal we must not forget that a certain proportionate part of the expense of the power plant must be borne by the electric motors which are drawing their current from it.

Besides the danger of explosion from the ignition of combustible gas there is the danger of electric shock. We can reduce the voltage to a point where shocks while disagreeable are not dangerous or we can so protect the bare wires that there is little possibility that men passing to and fro underneath them will be shocked. Either means adds enormously to the original cost of installation.

The same objection applies to both electricity and compressed air, that the theoretical efficiency of the system is high but electricity is even more apt to leak than air. Mining conditions make an absolute prevention of these leakages almost prohibitive in expense. The ordinary mine operator therefore satisfies himself that the leakages cannot be avoided and gets an efficiency which is far below that theoretically obtained.

Early History of Gasoline Mine Motors

So far as I have been able to discover, the gasoline mine motor was in general use in Europe before it was even considered in this country, its development on that continent being nearly coincident with the evolution of the automobile. The motors had single or twin cylinders of low power and speed. They were not to be compared for a moment with the motors which have been developed on this side of the water. Yet, even under these conditions, they furnished what was considered the most economical means of haulage.

In this country some motors were built in Chicago and probably in St. Louis also, some seven or eight years ago; and I have heard a rumor that motors were built in Pennsylvania about the same time. The Geo. D. Whitcomb Co. also built a motor about the year 1900, which a year ago was still running. Besides these, I believe one or two other companies built motors for use in mines at quite an early date. The St. Louis motors were built by a concern which was unfamiliar with mining conditions. They consisted essentially of a slow-speed, single-cylinder, stationary type of engine, mounted on a mine car. The firm built about a dozen of them, shipped them out to the mines in the adjacent territory and they were all promptly returned, as they cost more money in repairs than the value of the coal they hauled.

The Mascoutah Experiment

We built one motor for a firm operating in Illinois. It was placed at first in a mine in which the grades were so excessive that the motor could not pull itself over them at all. This motor was slightly changed and shipped to the Kolb Coal Co., Mascoutah, Ill., and so far as we know is still in running condition and at work. This coal company now operates four of our motors of later model. The motor at Mascoutah had extremely light work to do so it kept on running despite its faults and we thought we had the whole problem of gasoline-motor haulage solved then and there. It was not until we built one or two more motors that we discovered that the work to which the machine was put had so much to do with its durability.

The company which I represent was originally formed to manufacture and sell the Harrison mining machines, which were the original compressed-air punchers. We have, therefore, been familiar with mining conditions for a great many years, and it seemed to us, about eight or ten years ago, that the gasoline mine motor offered

us a field for increasing our business and would also put a check on the increasing use of electric mining machines. Many companies were installing electricity for coal cutting at that time simply because of the convenience which it offered as a means of haulage. Therefore, we started to build gasoline mine motors so as to give those who wished to use compressed-air punchers a suitable method of haulage.

Need of Great Strength

As I have said, the first motor which we built and sent to Illinois was put on such light work that we heard nothing from it. The second motor was sent down into Kentucky, I believe, and was an eight-ton machine. It was expected to haul about 800 tons of coal over a rolling grade some 2500 to 3000 ft. long; and except for the increase in size, we built this motor very much as we had erected the one we placed in Illinois. In other words, we took an automobile engine, transmission and clutches and put them on a frame and fully expected that the combination would haul coal. And it did most successfully, so long as we could make it stay together.

I have no record of the number of times this motor was rebuilt, but I do know that for three or four years about all I heard from the factory in regard to the gasoline motor was that it was being rebuilt. The owners of the mine showed exemplary patience, but at last even this was finally exhausted, and our motor was thrown out. In the meantime, however, we had tried many different engines, from the lightest to the heaviest type, from the automobile motor to that constructed for heavy marine work; from the cheap engines to the most expensive. We had experimented with many different forms of clutches, and gears made in all shapes and of all materials, and at last we felt sure that we knew in the main what features would work and could avoid those devices which were unsuited.

The next motor that we built was sent down to the Roane Iron Co. at Rockwood, Tenn. In this machine we incorporated an enormous factor of safety, which we had found necessary from our experience with the Kentucky motor. It was on this particular machine that we evolved the clutch which has since proved so successful. We used an engine of our own design made extremely heavy and of high-grade material, with the idea that we might possibly get an engine that would hold together. Up to this time we had been driving direct from the transmission to the front axle with gears and chaining back from the front to the rear axle, and the unequal strain from the gear-drive caused us endless trouble through broken axles. This machine was rebuilt and given the modern transmission and chain drive and ceased to give any trouble. The second machine which we sent into this mine had the chain drive, the present form of clutch, and of transmission, and it gave success from the first. It was practically of the same design as we are using today. We have changed some of the smaller features and have brought out other sizes of the same motor, but in the main, our later motors have been like the second locomotive installed in the Roane mines.

❖

Lining the Flush Pipe

SYNOPSIS—In flushing granular material into the worked-out sections of mines, unprotected pipes soon fail through the abrasive action of the material handled. Experiments with various pipe linings are here described and the results given.

❖

There seems to be no question but that flushing, or hydraulic stowage, in the worked-out portions of a mine is the best means of preventing surface subsidence. This method, however, involves many difficulties and considerable expense.

One of the chief sources of annoyance in this operation is the destructive action of both water and material handled upon the flush pipes. This, of course, varies with the nature of the filling, some substances being much more rapid in their action than others. Any material, however, that is fit to form an adequate filling will cut out an iron or steel pipeline in a surprisingly short time.

In order to overcome the corroding and abrasive action of the liquid and material handled, various pipe linings have been tried with more or less success. Wood has been, and is still used to a considerable extent for this purpose. This material, however, requires frequent renewal, and is, therefore, rather expensive for the service rendered. One or two installations have been made recently with cement-lined pipe, but these have been in service for so short a time, that no accurate conclusions may be drawn.

The Germans have, perhaps, had more experience along this line than any other people engaged in coal mining. In the Westphalian district, along the lower waters of the Rhine, the coal measures which are encountered at a considerable depth are covered by strata which are decidedly soft and yielding. The surface, moreover, is comparatively level and low so that any considerable subsidence would render the land subject to inundation.

Extra precautions must, therefore, be observed to prevent, so far as possible, any settlement whatever of the surface. Careful experiment has shown that where hand packing is employed in the old workings, a surface subsidence equal to 40 per cent. of the thickness of the seam may be expected, while with hydraulic stowage the ground only settles about 10 per cent. of the same thickness.

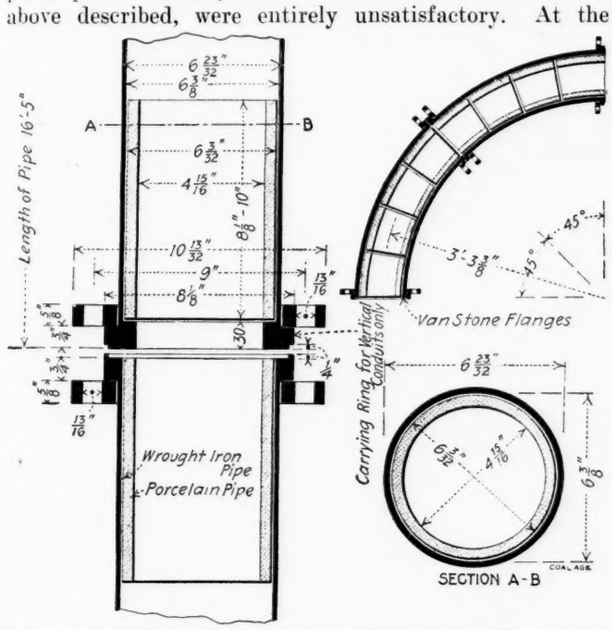
Due to its geographical location and the severe restrictions imposed by the mining authorities, the Gewerkschaft Deutscher Kaiser was one of the first German mines to adopt hydraulic stowage upon a large scale. The stowage material used was pulverized slag from the blast furnaces of which about 2000 tons was available daily. Experiment showed that wrought-iron or steel pipe 5 mm. (approximately $\frac{3}{16}$ in.) in thickness wore through after 16,000 tons of this material had been passed. Even by turning the tubes three times, each turn being for one-third of a revolution, only 48,000 tons could be handled before the failure of the pipe. In some instances, the tubes failed before the third turning could be accomplished, and much interruption of work was thus occasioned.

To overcome this rapid wear and consequent expense, a series of experiments were undertaken by the mining engineer, Peter Mommertz. These tests were directed toward finding a practical lining for the pipes which

would be more durable than the ordinary wrought iron. From these experiments it was ascertained that porcelain, glass and earthenware were more durable than either wrought or cast iron or steel. As these were laboratory experiments only, and might, therefore, prove deceptive, tests were begun upon a more comprehensive scale.

A number of pipes were accordingly lined with these different materials and put to work conveying the packing material underground. After 47,000 tons of material had been passed through the pipes, those of unlined wrought iron were worn out. Those lined with cast iron showed an abrasion of approximately ½ in.; those lined with glass showed a wear equivalent to from $\frac{1}{16}$ to slightly over ⅛ in., while the porcelain-lined pipes showed no wear at all, the linings being merely polished at the joints.

Experiments conducted on wood-lined pipes using fir, pitch pine and oak, under similar conditions to those above described, were entirely unsatisfactory. At the



SECTION OF PIPE SHOWING THE LINING ON STRAIGHT LENGTH AND A CURVE

first inspection of such pipes, the lining was found to have entirely disappeared. It was believed that a part of the lining wore through, giving the flowing water a chance to loosen up and carry away the remainder.

The iron or steel pipes used in these experiments were ordinarily 5 m. (approximately 16 ft.) long. The porcelain linings, however, were made up in short lengths, never exceeding 1 m. These linings were firmly held in place in the manner shown in the accompanying illustration. The short lengths of the lining pipes also make them easy of transportation in the ordinary mine car.

One of the principal difficulties encountered with the porcelain linings was the presence of elbows in the pipes. This may be overcome in one of two ways: First, making the bend of long radius, so that the solid material carried does not come sharply in contact with the lining. This also reduces the friction, due to the bend. Second, a fitting can be made which is similar in principle to the ordinary dead end T. This contains a pocket which fills up with the material carried and forms as a "buffer" for the sand to impinge upon.

So satisfactory has been the use of these linings, that they are now employed throughout the entire flushing system of this mine and are giving results in everyday operation which are vastly superior to those afforded by anything else. They have also been introduced extensively in Belgium, France and other regions of Germany. It has been found, furthermore, that on lengths of horizontal pipe a complete lining is unnecessary, as a half or slightly less than half lining will answer all purposes.

Although hydraulic stowage and the disposal of mine refuse is a serious problem at many American collieries, this particular pipe lining has never been tried. The American patents are controlled by the Rhineland Machine Works Co., of 140 West Forty-second St., New York. This company informs us that one firm of American operators has manifested great interest in this invention and contemplates giving it a practical test at no very remote date. This will be watched with great interest by all American mining men.

Death of Baird Snyder

When an automobile in which they were riding got beyond the control of the chauffeur and plunged over a 75-ft. embankment at Scott's Hill, near Wapwallopen, at 4 o'clock, July 8, Baird Snyder, Jr., of Pottsville, and C. S. Shindle, of Tamaqua, were fatally injured. Mr. Shindle lived only a few minutes and Mr. Snyder died next morning at the Wapwallopen Hotel without regaining consciousness. Mr. Snyder was the president of the Locust Mountain Coal Co., and former general superintendent of the Lehigh Coal & Navigation Co. He was also vice-president of the Hirsch Electric Mine Lamp Co.

The men were on their way from Hazleton to Berwick. Somewhere near Briggsville they got on the wrong road, reaching Scott's Hill, where the fatal accident occurred. The chauffeur, failing to notice a sharp turn about half way down the hill, let the car run rapidly. Sighting the turn when it was too late, he threw on the emergency brake and reversed his engines. The momentum of the car resulted in the stripping of the entire rear gearing and the automobile plunged over the embankment into the ravine below. Snyder was thrown clear of the car. He failed to regain consciousness and died next morning.

Shindle was caught beneath the tonneau and was crushed to death. One of his eyes was torn and every bone in his body broken. It was necessary to use block and tackle to free his body from the wreckage. Lyman, the chauffeur, was found on the mountainside tearing his hair out by the roots and crying convulsively. He is a young man about 19 years of age and comes from New York City. Two of his fingers were torn off.

International Exposition of Safety and Sanitation

The First International Exposition of Safety and Sanitation ever held in America will take place in New York City, Dec. 11-20, 1913, under the auspices of the American Museum of Safety.

All branches of safety and sanitation work will be represented. Exhibits from foreign countries will by a special act of Congress be admitted free. Much work of like kind has been done abroad, and there are 21 museums of safety in Europe; these will all contribute to the exhibit.

The Economical Use of Anthracite

By Reginald Trautschold*

SYNOPSIS—A detailed analysis of the various costs of the different grades of anthracite coal. Also a study of the economies to be effected by using mixtures of the different sizes. It has been found that operating costs at large plants can be materially reduced by this means without any appreciable loss in efficiency.

Necessity for husbanding the anthracite-coal deposits of the country has led to many tests and experiments to ascertain the economic value of low-grade coals and has thereby given considerable publicity to the matter of "the rational use of low-grade fuels." These are steps in the right direction, but it would seem that a more important consideration is "the rational use of *lower*-grade fuels." This does not mean that the low-grade fuels should not be utilized as much as possible and that every effort should not be made to perfect grates upon which to burn rice, barley, culm, etc., economically, nor that progress in perfecting the gas producer for operation on these comparatively poor fuels, is not of the utmost importance.

Economies Effected by Mixtures

All such efforts, tending toward the conservation of our fuel deposits, should be strenuously pushed; but of even greater importance (owing to the thousands of power plants which operate on specific grades of coal and which will probably continue to be so operated for years), is the rational use of *lower*-grade fuels. That is, the use of mixtures of standard sizes rather than confining ordinary consumption to some one specific size. For instance, a plant designed to operate on pea coal can, nine times out of ten, burn a mixture of pea and buckwheat as efficiently and with considerable profit to the owner of the plant. Naturally, what is true of anthracite coal is equally true of bituminous coal and other fuels, but the limited scope of this article necessitates confining the discussion to the use of anthracite—which coal is also better standardized as to sizes and heating values, etc.

Considering anthracite coal and its use only from an economic standpoint, it is true that coal from various mines differ in heat-generating value. This has led to the forming of certain companies that sell coal on a B.t.u. basis, instead of entirely by weight. While all mines do not produce coal of equal heating value, nevertheless good anthracite does not vary so much in this respect as to prohibit a fairly accurate average being arrived at as typical of this kind of fuel.

Furthermore, in the standard preparation of anthracite for the market, the amount of slate, bone and other foreign material that may be contained in any standard grade of coal is specified and this allowable proportion of foreign material—reducing the heating value of the coal—increases as the size of the coal decreases. Anthracite coal may then be considered in units of heating value even more logically than by weight. A million B.t.u. may, therefore, be taken as the unit of measure and the economic value of the various sizes of coal based on such classification, the weight of coal containing such heating value growing greater, as the size becomes smaller.

An Analysis of the Cost of Coal

Three distinct charges can be usually credited to the cost of coal at the power house, first, the price of coal at the mines, second, the transportation or freight charge, and third, a burden consisting of the retail dealers' profit, or the cost of transferring the coal from its railroad or barge terminal to the power house. The present average price (April, 1913) of anthracite coal at the mines, at tidewater, New York, and the average price of the coal delivered at the power house (all expressd in cents per million B.t.u. heating value of coal), is graphically depicted in the accompanying chart.

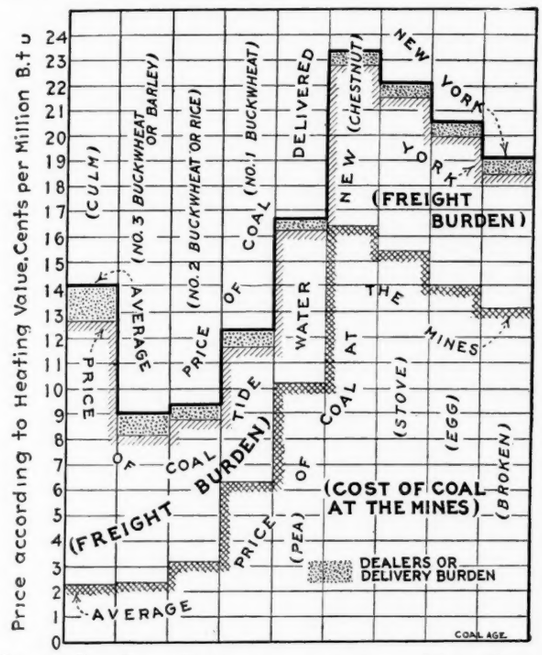


Chart I. Cost Burdens on Coal at New York

The price of coal at the mines varies as would be expected, the prepared sizes, from broken down to pea, increasing as the size of coal decreases, while the price of the washery sizes, from pea down to culm decreases as the sizes of the coal becomes less. The freight burden, on the other hand, is very nearly constant for all sizes of coal, if heating value is made the basis of consideration, though decreasing in rate per ton below pea and being constant (per ton) for the prepared sizes of anthracite. The burden of delivery or dealers' profit, being based entirely on weight, increases as the heating value of the coal decreases; that is, the poorer coal carries a proportionally greater burden.

The conditions governing the economic value of coal at present prices then varies considerably with the location of the power house. At the mines, the most economic fuel, provided it could be efficiently consumed, is culm, although its present economic value as a fuel is very little better than that of buckwheat No. 3. At tidewater, New

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York, or delivered New York, culm (provided again it could be economically used) would not be as economical as the much richer fuel, buckwheat No. 1; buckwheat No. 3 is here the most economic anthracite fuel where it can be efficiently burned, but when delivery charges, etc., are taken into consideration, there is little difference between rice, buckwheat No. 2 and barley, buckwheat No. 3.

In fact, changing from the use of the more expensive coal to barley would probably show very little or no saving in the cost of fuel at a New York power house, owing to the greater labor charge, expenses for special

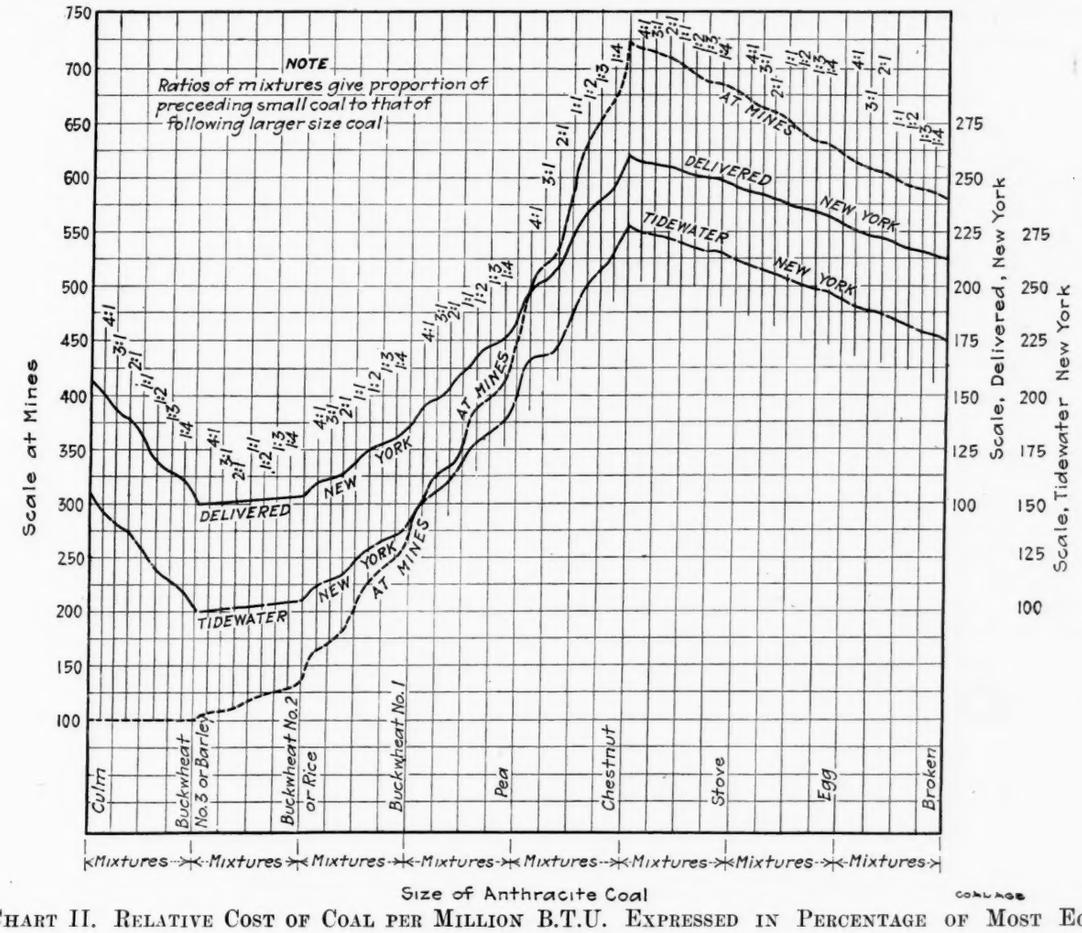

CHART II. RELATIVE COST OF COAL PER MILLION B.T.U. EXPRESSED IN PERCENTAGE OF MOST ECONOMIC FUEL

grates, increased quantity of ashes to be disposed of, etc., that would be necessary when operating on the less efficient, though cheaper fuel. In any locality, chestnut is the most expensive fuel among the anthracite coals, and for this reason is principally confined to special uses and domestic consumption. This is also true of stove and egg.

Broken coal is likewise limited to special uses, the principle one of which is the coaling of locomotives. Here the wisdom of the railroads is well illustrated for the question of freight is much less a burden to them than to the public. Hence, the economic fuel for a locomotive is also the economic fuel of the mines. At the mines, broken anthracite is relatively about as cheap as pea, and when the severe conditions under which a locomotive must operate are taken into consideration—conditions far more adverse than those existing in any power house—it is probably the most economic grade of anthracite coal they could use. Egg, stove and chestnut are too expensive for general use by locomotives, but pea is used with relative economy. The smaller coals are unsuitable for locomotive use unless briquetted, but briquettes of low-grade anthracites, with and without the addition of some bituminous coal, are being successfully used on many locomotives. In fact, certain manufacturers of briquettes turn their entire output over to the railroads.

MIXTURES SHOULD BE MORE GENERALLY ADOPTED

The best use of the small sizes of anthracite coal would then seem to be in the stationary power house. The advent of the gas producer has made possible the most economic use of these grades of smaller sizes of anthracite. Even culm has been used as fuel in gas producers in Germany since 1903, 2.2 lb. being consumed per horsepower-hour. In this country, though the use of gas producers is rapidly increasing, the general use of coal for the generation of steam in power houses still continues, and the main consideration is, therefore, its most economic use for this purpose. However, the use of coal as fuel, whether burned on grates or used in the generation of a power gas in producers is, of course, directly dependent upon its heating value.

Its economic use provided that the various sizes of coal can be burned or reduced with equal efficiency, is then dependent upon the price paid per heat value and not upon the price per ton of coal. This has naturally led to the almost universal practice of using only the small sizes

of anthracite in the power house, and to the building of grates, etc., for the accommodation of specific sizes of coal. The manufacturers of furnaces having done much toward increasing the use of small standard sizes of anthracite, it devolves upon the power-house owner to develop this still further by the use of *lower*-grade fuels. This can be accomplished by using mixtures of standard sizes of coal and gradually remodeling the plant and adapting it to use lower and lower grades.

This is realized at many efficiently managed plants, for the use of mixtures of standard sizes of coal is becoming steadily more general. There are many more plants, however, where the exclusive use of the particular sizes of coal for which their grates were originally built, still continues. Every such plant is not only wasteful of one of the nation's greatest and most valuable natural resources, but is paying much more than necessary for fuel —an economic blunder that can ill be afforded in this day of keen competition and corresponding necessity of waste elimination.

A plant operating on pea coal could probably be operated, with no changes, on a certain mixture of pea and buckwheat No. 1, the proportion of the latter being less than that of the larger coal; or a plant operating on buckwheat No. 1 could be operated with probably greater economy and quite as conveniently if a certain quantity of rice or buckwheat No. 2 was mixed with the regular fuel.

Furthermore, as the grates in any furnace have to be renewed from time to time, advantage might be taken of this fact to substitute a little finer grate with each renewal, so that a larger and larger proportion of the finer coal could be burned efficiently. Each increase in the proportion of the finer coal contained in the fuel fired would mean a reduction in the amount of the fuel bills. A point would undoubtedly be reached in every plant where increased difficulties of burning the fuel fed to the grates, the expense of accessories that might be necessary, etc., would limit the fineness of the coal that could be efficiently used in that particular plant; but in nearly every instance this limiting size of coal or mixture of coals would be less than that used in present practice. Such gradual alteration in the grade of coal used in any plant can be accomplished with no immediate expense and probably with an appreciable gain in economy from the very start.

Based on the assumption that the various standard sizes of anthracite coal can be used with equal efficiency, likewise mixtures of two sizes of coal, Table I gives the average price of the various sizes and mixtures at the present time (April, 1913,) per million B.t.u. heating value of coal at the mines, at tidewater, New York, and delivered New York. Chart II graphically illustrates the relative economic value, as heating mediums, of the various coals and mixtures in percentages of the most economic coal at each of the three points.

As an example of the advantage to be obtained by mixing coals of two standard sizes, a plant ordinarily operating on straight pea coal may be considered. Taking the cost of fuel per heating value of pea as unity, an addition of 20 per cent. of buckwheat No. 1 to the regular fuel would mean a reduction in the fuel bill of nearly 5¼ per cent. The quantity of buckwheat No. 1 added must, of course, be sufficient to replace the actual heating value of the coal it replaces. A mixture of half pea and half buckwheat No. 1—proportions in heating value of the two coals—would show a saving of nearly 13¼ per cent., while the substitution of straight buckwheat No. 1 for the pea would show a reduction of approximately 26½ per cent. in the cost of fuel necessary for developing the same power. These changes in fuel would have to be gradual, of course, and it might never be feasible to substitute straight buckwheat No. 1 as the regular fuel for the plant; still a considerable saving in the cost of fuel could probably be arrived at, and the most economic grade ascertained, by a gradual substitution of a poorer mixture for the regular pea fuel.

Savings Effected

The above savings could not actually be fully realized, it is true, on account of the increases in the amount of coal that would have to be handled, the ashes to be disposed of, and perhaps a slight increase in the labor item, but quite appreciable economies in fuel consumption could be made and this item constitutes from 60 to 90 per cent. of the total cost of power in a steam plant. A saving of but 5 per cent. on 60 per cent. of the cost of power would probably mean a net saving of anywhere from $500 to $1500 per year in a 500-hp. plant.

The development of gas producers has now reached a point where such generators can be economically and efficiently operated on the lowest grades of anthracite, and, unquestionably, the time is not far distant when the general use of anthracite fuel will be much more rational and economic than it is today. The broken coal may still be used, to some extent at least, for locomotive fuel, but even here the lower grades of anthracite will be used more extensively—in the form of briquettes.

The prepared sizes of anthracite will then be used almost entirely for special purposes; pea for domestic heating, etc.; the power house will be operated exclusively on the smaller sizes of anthracite, down to rice or even down to a mixture of rice and barley; mixtures of barley and culm and eventually straight culm will be used as fuel for gas producers, thus realizing the full benefit of "the rational use of the *lower* grades of fuel," as they refer to anthracite coal.

Conservation of the nation's anthracite coal deposits, a question that is rapidly becoming of paramount importance, would thus be taken care of by affecting the purses of the coal-consuming public, the only practical solution of the anthracite-coal question. And this can be done with profit to all, without reducing the revenues of the coal carriers—in fact, increasing the volume of transportation—and to a considerable profit to the mine owners by providing a market for much coal that is now comparatively worthless or of little value.

TABLE I. AVERAGE PRICE OF ANTHRACITE COALS, PER MILLION B.T.U.—APRIL, 1913

Culm	At Mines		At Tidewater, N.Y.		Delivered N.Y.	
	Cents	Per cent.	Cents	Per cent.	Cents	Per cent.
*.....	2.270	100.00	12.720	155.00	14.100	157.00
4 : 1.....	2.278	100.36	11.816	144.20	13.080	149.00
3 : 1.....	2.280	100.44	11.590	141.20	12.825	142.50
2 : 1.....	2.283	100.57	11.213	136.80	12.400	137.77
1 : 1.....	2.290	100.88	10.460	127.50	11.550	128.33
1 : 2.....	2.296	101.14	9.706	118.30	10.700	118.88
1 : 3.....	2.300	101.32	9.330	113.70	10.275	114. 7
1 : 4.....	2.302	101.41	9.104	111.00	10.020	111.33
Buckwheat No. 3 or Barley						
*.....	2.310	101.76	8.200	100.00	9.000	100.00
4 : 1.....	2.470	108.81	8.294	101.20	9.070	100.77
3 : 1.....	2.510	110.50	8.320	101.40	9.090	101.00
2 : 1.....	2.560	112.65	8.360	102.00	9.120	101.33
1 : 1.....	2.710	119.30	8.435	102.60	9.180	102.00
1 : 2.....	2.840	125.00	8.513	103.65	9.233	102.60
1 : 3.....	2.910	128.20	8.550	104.20	9.260	102.90
1 : 4.....	2.950	129.85	8.580	104.55	9.280	103.10

Buckwheat No. 2 or Rice						
*	3.110	137.00	8.670	105.70	9.350	104.00
4 : 1	3.740	165.00	9.270	113.00	9.940	110.44
3 : 1	3.900	171.50	9.420	115.00	10.090	111.21
2 : 1	4.160	183.00	9.666	117.80	10.333	114.80
1 : 1	4.680	206.00	10.175	124.00	10.830	120.33
1 : 2	5.200	229.00	10.670	130.20	11.320	125.80
1 : 3	5.465	240.05	10.920	133.10	11.560	128.44
1 : 4	5.620	247.50	11.070	135.30	11.710	130.11
Buckwheat No. 3						
*	6.250	275.50	11.666	141.50	12.300	136.66
4 : 1	7.040	310.00	12.570	153.30	13.200	146.66
3 : 1	7.490	329.50	12.800	156.20	13.405	149.00
2 : 1	7.570	333.00	13.180	160.70	13.770	155.22
1 : 1	8.225	362.00	13.940	176.00	14.510	161.22
1 : 2	8.860	390.00	14.700	179.00	15.247	169.41
1 : 3	9.210	397.50	15.080	183.80	15.615	173.50
1 : 4	9.410	414.00	15.310	187.00	15.810	176.00
Pea						
*	10.200	450.00	16.220	197.70	16.720	185.00
4 : 1	11.440	504.50	17.730	216.40	18.036	200.40
3 : 1	11.750	518.00	17.850	217.80	18.365	204.05
2 : 1	12.270	540.00	18.200	221.80	18.913	210.16
1 : 1	13.300	586.00	19.490	237.50	20.010	222.33
1 : 2	14.330	631.50	20.560	250.30	21.110	234.55
1 : 3	14.850	654.00	21.120	257.20	21.660	240.66
1 : 4	15.160	668.50	21.650	264.00	21.984	244.27
Chestnut						
*	16.400	722.50	22.750	277.50	23.300	259.00
4 : 1	16.200	714.00	22.500	274.50	23.056	256.18
3 : 1	16.150	712.00	22.490	273.50	22.995	255.50
2 : 1	16.060	707.00	22.333	272.30	22.890	254.33
1 : 1	15.890	700.00	22.125	270.00	22.690	252.00
1 : 2	15.720	692.50	21.920	267.50	22.486	249.84
1 : 3	15.640	685.00	21.810	266.00	22.385	248.20
1 : 4	15.580	681.50	21.750	265.50	22.324	248.00
Stove						
*	15.380	678.00	21.500	262.30	22.080	245.33
4 : 1	15.110	666.00	21.190	258.30	21.760	241.80
3 : 1	15.020	662.00	21.110	257.30	21.685	240.93
2 : 1	14.920	657.50	20.980	255.80	21.550	239.66
1 : 1	14.690	652.00	20.730	253.00	21.290	236.50
1 : 2	14.460	637.00	20.470	249.50	21.170	235.20
1 : 3	14.345	632.50	20.340	248.00	21.000	233.30
1 : 4	14.276	628.00	20.260	247.00	20.900	232.20
Egg						
*	14.000	616.50	19.950	243.50	20.500	228.00
4 : 1	13.830	610.00	19.650	240.00	20.204	224.50
3 : 1	13.790	607.00	19.575	239.00	20.130	223.70
2 : 1	13.720	604.00	19.450	237.50	20.007	222.30
1 : 1	13.580	597.50	19.200	234.20	19.760	219.55
1 : 2	13.430	591.50	18.950	231.30	19.513	216.70
1 : 3	13.360	588.50	18.825	229.50	19.390	215.44
1 : 4	13.320	586.50	18.750	228.60	19.316	214.62
Broken						
*	13.150	580.00	18.450	225.00	19.020	211.33

* Indicates a straight grade unadulterated.

Note:—First number refers to proportion of grade coal under heading; second number refers to proportion of next larger grade coal. Proportions according to heating value of coals.

New Element Causes Trouble

The activities of the Industrial Workers of the World in some parts of the anthracite coal regions of northeastern Pennsylvania are giving rise to some difficult situations. The I. W. W. has been trying to organize in that section in competition with the United Mine Workers of America for some time past. It is said that it hopes ultimately to absorb the latter organization.

The appointment of local grievance committees, agreed to at the conferences between the mine workers and the operators last year, has proved fruitful of more local strikes than any other cause. One reason for this is that there is just enough of the foreign element (chiefly Italians, Poles and Slavs, who are more easily cajoled by the promises of the I. W. W.) to have a member of that organization on many of the grievance committees.

These members find it easy to tell miners, even those who had not thought of presenting any grievances, that they are suffering abuses. If they tell a miner that he is working in a difficult place, that his is a bad spot and he ought to be getting more money for his coal, he is more than ready to believe them. Many of the local strikes are "button strikes"—efforts on the part of the United Mine Workers to increase their membership—but the presence of the I. W. W. agitators accounts for a fair proportion of the labor troubles.

A New Illuminated Steel Sign

To fulfill the demand for safety appliances and to conform with the many "Safety First" campaigns carried on by railway, mining and power companies, the Electric Service Supplies Co. has placed on the market a new type of illuminated sign like that shown in the accompanying illustration.

These signs consist of a steel frame joined at the top in the shape of a hood under which is placed a weatherproof socket for one incandescent lamp. The hood is given a coat of aluminum paint on the inside and acts as a reflector as well as a protection to the light bulb.

Standard enamel steel signs are attached to this frame by means of six machine screws, the standard size of the sign proper being 10x12 in.

ILLUMINATED DANGER SIGN IN FIVE LANGUAGES

These signs may read in several different languages like the one shown herewith, which portrays the message in English, Italian, Lithuanian, Polish and Slovak. They may be fitted with weatherproof condulets or bushings to protect the leading-in wires which enter the end of the hood, and to insure the proper operation of the sign after a maximum of rough usage.

They are used effectively in mines, power plants and along railways or at any point where human life is endangered by exposed electric wires, switches or third rails. In mines where an illuminated sign is essential they are used extensively to warn the workman of the danger of gases, falling timbers and electric wires. For railway companies their use at stations and cross-overs to inform the public of possible danger is fully recommended.

Our British Coal-Mining Letter

SYNOPSIS—Experiences in the British mercantile marine show that the mining industry of America has saved several steps in the direction of economy by not adopting triple-expansion (or similar) engines but by exchanging noncondensing reciprocators for steam turbines with a condensed exhaust. The "coefficient of volumetric efficiency" in air compression is not really an efficiency factor. Controllers do not produce undesirable strains on hoisting machinery.

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At a meeting of the North-East Coast Institution of Engineers and Shipbuilders, at Newcastle, Eng., C. W. Cairns presented the results of a comparative trial between a cargo steamer fitted with geared turbines and one equipped with triple-expansion engines. The vessels were almost identical in essential characteristics for the purpose of the trial. Instructions had been given that the revolutions of the screw in each case should be as nearly as possible 62 to 63 per min. and that the vessels should be kept within signaling distance of one another. During the journey, the weather freshened, and a strong head wind and sea were encountered; therefore the revolutions were allowed to remain at from 60 to 62, the horsepower under such circumstances when running at 63 r.p.m. being excessive and abnormal.

The coal used during a continuous run of 36 hr. was measured. Owing to the heavy sea no extremely favorable figures were obtained for coal consumption per i.hp. Mr. Cairns declared that it was not safe to accept claims sometimes made that triple-expansion machinery could perform its daily work with from 1.2 to 1.5 lb. of coal per i.hp. The coal used per day by the two ships with triple-expansion engines was 32.7 tons and by that with a geared turbine set 27.8 tons. Thus the turbine showed an economy of 15 per cent. over the triple-expansion engines. Looking at the result from the opposite point of view, the triple-expansion engine demands 17.6 per cent. more fuel than the turbine set.

Air Measurement for Compressors

During discussion of a paper before the Midland Institute of Mining, Civil and Mechanical Engineers on the generation and use of compressed air for mining, P. O. Davis said that when tests with compressors are published the means by which the air is measured should be definitely stated. The result obtained is usually termed a "coefficient of volumetric efficiency." This is a rather misleading term, because it does not truly represent the efficiency of the compressor, and may rise to over 100 per cent. Perhaps the term "delivery coefficient" would meet the requirements better. People are apt to take it for granted that "volumetric efficiency" represents a ratio of work put in to work taken out, which, of course, is obviously not what is intended. This delivery coefficient cannot be accepted as correct unless actual measurements are made of the air delivered and are compared with those shown by the indicator diagram. There are several ways of measuring the air actually delivered. One is to pump out all the receivers. Another valuable method used for turbo-compressors is to force the air through an orifice, measuring the pressure before and after.

Measuring volumetric efficiency from the indicator diagram does not take into consideration the rise in temperature of the air in passing into the cylinder, which may be large, although not shown on the diagram. If the air is warmed up in passing through the inlet ports the temperature inside the cylinder is higher than that of the atmosphere. This increased temperature increases the volume of the air received and makes it appear that there has been a proportionate waste of air. In addition to the increase of temperature caused by warming, there is another loss caused by mixing the incoming air with air that has reëxpanded from the clearance spaces, and any additional high-pressure air which may have leaked past the piston rings or delivery valves.

Hoisting-Engine Controllers

The paper by James Black (see Coal Age, Vol. III, page 453) aroused much interest among Scottish engineers. Even in cases where the hoisting engine is given full steam to within about four revolutions from the end of the hoist when raising the normal load, he considers that complete control is desirable, as the speed which a cage loaded with men will attain, when it reaches that point with full steam on the engine, will be dangerous.

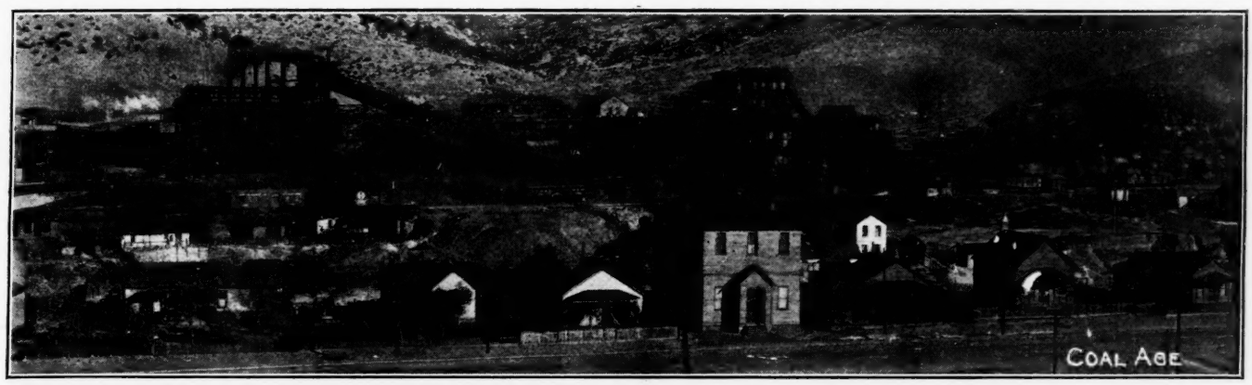
The opinion prevails that the greater the engine speed when the controlling gear comes into operation, the greater are the stresses set up in the machinery. Mr. Black considers this idea is entirely wrong, and says the rate of retardation varies directly as the acting force (the force producing retardation), and inversely as the moving mass, but it is entirely independent of its velocity. In other words, with a given braking force and a given cage load the rate of retardation is a constant, no matter what the engine speed may be when the controlling gear comes into operation.

The kinetic energy possessed by the moving mass varies as the square of the engine speed, and, consequently, when the controlling gear comes into operation the distance traveled by the cage before coming to rest also varies as the square of the speed of the engine. From this Mr. Black considers it is obvious that the stresses set up in the machinery when the controlling gear comes into operation are entirely independent of the engine speed. To show to what extent the Rosehall controller prevents "underwinding," he stated that three hen's eggs were placed on the cage in the bottom of a car. The hoisting engineer was then told to drop the cage in the pit bottom with the greatest speed which the controller would permit. He failed to break an egg, and could only slightly crack one and sometimes two of the shells.

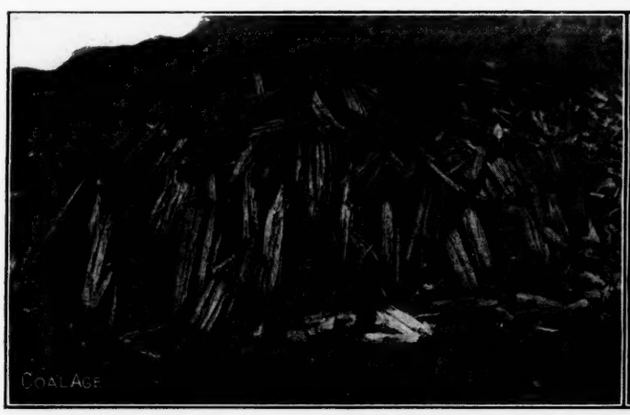
Primeval Erosion of Coal Beds

Professor Kendall, of the University of Leeds, declares that "washes" or washouts in the coal measures are frequent in Yorkshire. The relation of "washes" to "faults" is such that it seems highly probable that either one might have been the cause of the other, or that both arose from a common cause. It is evident that faulting was taking place during the whole of the deposition of the coal beds, as it was indeed during the whole of the carboniferous era. Change of level has been shown to interfere with the normal formation of coal, whether the measures were raised or depressed.

SNAP SHOTS IN COAL MINING



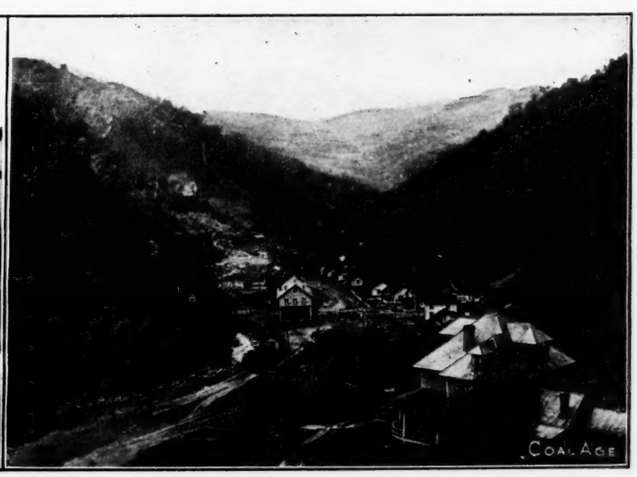
COAL WASHER, TIPPLE, BINS AND GENERAL SURFACE PLANT, COLORADO FUEL & IRON CO., STARKVILLE, COLO.



AT THE SUNNYSIDE PLANT OF UTAH FUEL CO.

Shows character of coke produced.

A night view at the ovens.



PLANT OF WESTERN FUEL CO., NANAIMO, B. C., CAN.

Shows headframe, tipple, washery and slack-coal conveyor.

OPERATION OF THE CARBON FUEL CO., CARBON, W. VA.

During recent strike trouble, camp was under martial law.

The Mine Explosion

By D. G. Thomas

Founded on an incident of the coal-mine explosion at Hanna, Wyo., June 30, 1903.

Ye lovers of the earth and sky,
The air and warm sunshine;
Give heed while I relate a tale
About a deep coal mine;
How death upon a sheet of flame
Rode madly through the pit,
And in his ire consumed with fire
The men who toil'd in it.

Two brothers from a distant land,
Two brothers fond and dear,
Had come from merry England's shores
To live and labor here;
Their wives—two handsome new made brides—
Came with them o'er the foam
To aid and bless with love's caress
The founding of a home.

They settled in a mountain camp
Where nature long had frowned.
So desolate the hills and plains
So barren was the ground
That not a tree nor e'en a flower
Could find a place to grow;
For shifting sand rolled o'er the land
Like winter's drifting snow.

These brothers were inured to work
From childhood in a mine,
Where ever-present dangers lurk
To frustrate man's design;
Where hardship left upon the brow
Its ugly mark of care,
Where all was blight and gloom and night
To those that labored there.

Their names—well, never mind their names—
We called them Bob and Joe;
As such we knew them in the mine,
As such we'll ever know.
When numbers are engulfed in death
By sheets of livid flame,
We note the sum of those o'ercome
And not so much the name.

Poor Mary from her childhood hour
Had known the keenest strife,
And happiness had only come
To her as Bob's sweet wife.
When he was close, her dark-brown eyes
Beamed forth her loving pride,
But when away, the neighbors say
She feared lest woe betide.

She'd talk to them about the mine,
About the deadly damp,
That ever waits to touch the flame
On some poor collier's lamp,
Then burning madly rush along
The channels underground,
Until its breath had stilled in death
All living souls it found.

And talking thus the tears would flow
Like rain adown each cheek,
Convulsive sobs would shake her frame
Till she could scarcely speak.
The neighbors noting well her grief
Declared with tearful sigh
If death should rob her life of Bob
She, too, would surely die.

But Joe's wife was a different lass,
Light hearted all day long;
No sadness seemed to cloud her sky
Nor mar sweet Nellie's song;
She'd laugh at Mary's gloomy moods,
Then say with playful wit:
"It's time enough to cross the bridge
When we have come to it."

Love plays queer pranks with women's hearts,
So masterful his skill,
That smiles and tears and hopes and fears
He causes at his will;
Poor Mary's tears her love bespoke,
For Bob they'd ever flow;
While Nellie's song the whole day long
Spoke equally for Joe.

The men worked on from day to day
Down in that dark, deep pit;
With pick and drill they'd toil until
The hour would come to quit.
Though weary, yet a cheerfulness
Remained to bless their lives
For, would not they in love's sweet way
Be greeted by their wives?

And would not Mary's eyes be wet,
Her tears of gladness flow,
And would not Nellie's joyful song
Give happiness to Joe?
A bath, and after that a meal—
The collier's main repast—
Would drive away the cares of day
Like chaff before a blast.

One morning in the month of June
The sky was bright and clear,
The whistle sent its dismal sound
To workmen far and near;
The miners heeding duty's call
Bade loved ones fond goodbye,
But not a sign came from the mine
To tell them death was nigh.

The gasmen in their morning round
Had been from place to place;
Had marked with chalk the day and date
Upon each working face;
Then out they went to meet the men
Who waited there in line
To hear them say the word, ere they
Went down into the mine.

The colliers one by one approached,
Approached, but dared not pass
The spot where stood those cautious men
Who watched the deadly gas,
And asked: "How is my place today?"
A watchman then replied,
"'Tis safe and sound, no gas was found,
All, all is safe inside."

And thus assured that all was well,
They entered that black hole,
And every man at once began
To blast and load his coal.
The engines groaned and shrieked and hissed,
The trips arose and fell,
The busy hum of rope and drum
Said all was safe and well.

The wives, engaged in wonted tasks,
Pursued them with a will;
The little children laughed and played
Most happily, until—
A shock as of an earthquake came
With fearful, loud portent;
Then from the mine came forth a sign
Which told them what it meant.

A terror such as fear provokes
Held all in its embrace;
A ghastly pallor spread its tinge
On every person's face.
They saw the angry smoke and flame
Leap upward from the slope,
And in its glare they felt despair
Rush in and stifle hope.

Oh! God! it is an awful sight;
Grim ruin everywhere!
Since this much we can plainly see,
What must it be down there?

What has become of those brave men
At work deep underground,
Who stood in line here at the mine,
When all was safe and sound.

At last the spell that held them all
Relaxed its fearful hold,
The frenzied women madly rushed
To where the flames had rolled,
And peering in that dark abyss
They yet could see a flare,
As though Death sought each open spot
To see if life were there.

In horror and in wild dismay
They gathered round that hole,
Imploring God to spare his rod
And save the collier's soul.
Poor Mary, foremost at the scene
Wept bitterly and long;
But Nellie's face we could not trace
Among the widowed throng.

Week after week brave volunteers
Undaunted by dismay,
Toil'd ceaselessly to find the men
Who died below that day,
But wreck and ruin filled the mine;
Obstructions high and wide
Like demons lay to bar the way
And keep the dead inside.

While Mary lingered near the mine,
The picture of despair,
Sweet Nellie, broken-hearted, stayed
At home, quite helpless there;
She knew no face, she heard no voice;
But plaintively and low
She tried to coo a love song to
Bring back her dear, dead Joe.

The evening Bob and Joe were found,
A figure wan and white,
Like lily fair was lying there
Upon her cot that night.
The stars were vying with the moon
In lighting heaven's dome,
When through the door an angel bore
Her gentle spirit home.

The hillside graves have long been filled
Bob sleeps in one alone,
And zephyrs sigh in passing by
With many a plaintive moan;
And Mary wandered far away,
Just where I do not know;
Still neighbors tell how poor, sweet Nell
Sleeps in the grave with Joe.

Recent Judicial Decisions Affecting The Coal Trade

By A. L. H. Street

Liability for Demurrage Charges—Carload shipments of coal destined to a pier were subject to demurrage charges while standing in yards at the place of destination, though not actually on the pier, awaiting the convenience of the consignee or the arrival of the vessel into which the coal was to be reloaded; the leaving of the coal in the yards not having prejudiced the consignee in any way. (Virginia Supreme Court of Appeals, Bank of Norfolk vs. Norfolk & Western Railway Co., 78 Southeastern Reporter 568.)

Salaries of Corporate Officers—A reëlected officer of a corporation is entitled to salary at the rate previously paid him, if nothing is said about the amount of his compensation in reëlecting him. (New York Supreme Court, First Appellate Division; Eicks vs. Wittemann Company; 142 New York Supplement 190.)

Authority of Agents—Where a business is conducted by the owner's agent, he has implied power to do whatever the nature and needs of the business require, and his employer is bound by such acts. The rights of third persons dealing in good faith with an agent within the apparent scope of his authority are unaffected by secret limitations placed on his authority by the employer. (Alabama Court of Appeals, Wooten vs. Federal Discount Company, 62 Southern Reporter 263.)

Elastic Corrugated Piping

Recently a process of manufacturing corrugated pipe has been patented, by which either standard, wrought-iron or steel tubes can be corrugated by the Maciejewski process, as it is known. According to the pressure and same as in the original tube. During the process of corrugating any defects in the material at once become apparent. Interesting examples of corrugated tubes and bends are shown in Fig. 1. They can be made in sizes from 1⅜ in. up to 18 in., including diameters suitable for use in boilers. Here the average length is about 18 ft., although any other length can be manufactured.

In steam-pipe lines, contraction and expansion caused by the steam, the vibrations from the engines, pumps, or other units are effectively taken care of by the elastic property of the tubes. They may be also used in fire-tube boilers, superheaters and radiators for hot water and steam heating, to excellent advantage.

Another advantage is where the space for expansion and contraction is limited, and large bends cannot be used. When steam is turned on or off there is a wide variation in the temperature; hence a considerable linear movement in the line and its branches to the various units. This movement is easily taken up by a length of this corrugated pipe.

In Fig. 2 an ordinary 6-in. pipe is shown, bent in the shape of a loop, one end being fixed and the other movable. When subjected to a lateral pressure of 1289 lb., the axial movement was 11½ in. A corrugated pipe of

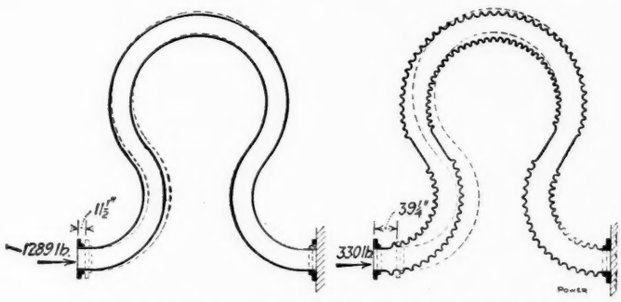


Fig. 2. Difference in Pipe Movement

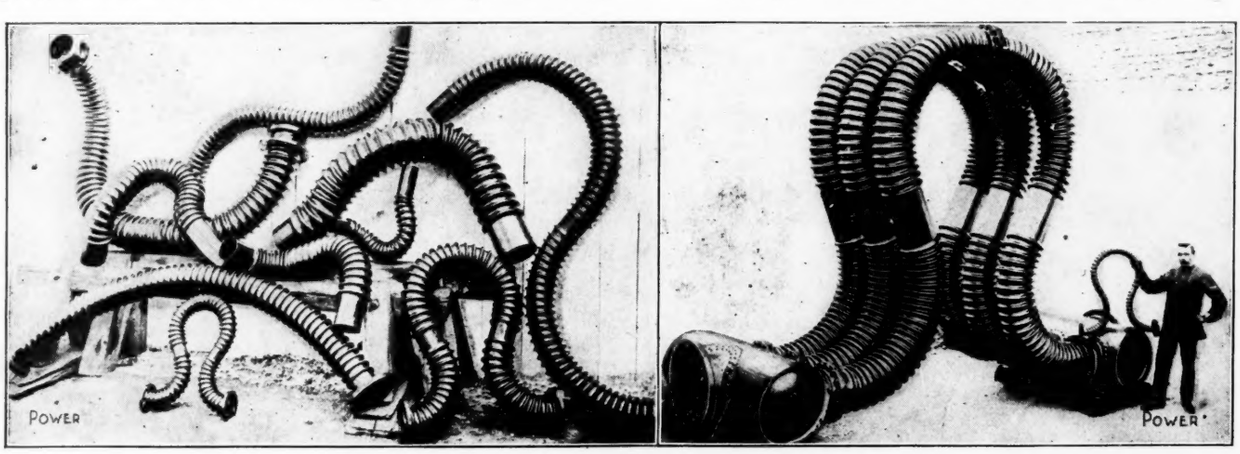


Fig. 1. Examples of Corrugated Tubing

size required, small- and medium-sized tubes are made from ordinary steel tubing. For large diameters, lap-welded and re-rolled tubes are used, says *Power* of June 10, 1913. The corrugations are made by a method of pressing the material together, a special patented machine being employed. The process shortens the tubes as the corrugations are pressed into them at equal distances apart, but without decreasing the original inside diameter and the thickness remains uniform and is the same size and thickness was bent and fastened in like manner, and on applying 330 lb. pressure there was an axial movement of 39¼ in., or over three times that of the smooth pipe.

The process for making this corrugated pipe is patented in Europe and in the United States by N. Maciejewski. The pipe is being made in Russia, Germany, Belguim and France. The United States patents are for sale by Schuchardt & Schütte, 90 West St., New York.

EDITORIALS

The Fireboss and the Union

When a man accepts a position of trust and control, he must not submit himself to the dictation of those he is expected to restrain. It seems so obvious that action of this kind ought not to be taken that it seems a folly to make this trite observation. Yet the miners in the anthracite region are insisting that the firebosses who are required to maintain discipline in the mines of that district shall join the union and subject themselves to its rulings.

We do not believe that any of the miners who advocate so unfair a proposition would want the officials of their union to join an operators' organization, which would suspend or fine them if they did not follow its behests and the members of which would threaten them with personal injury if they did not compty with its commands. Such an organization would under the law be illegal and is almost unthinkable under present-day conditions. Yet the parallel is not unfair.

Much trouble we imagine would develop if a fireboss who had joined the union were to venture to order his pit-committeeman to make the latter's place safe or to wait till his room was cleared of firedamp, or to go out and get his bit made of proper guage. The fireboss has difficulties enough in disciplining the miners under his charge. It is not right to compel him to be amenable to both mine owner, union and state. If any change is needed, it is that he shall be a servant of the Department of Mines alone, so that he may be entirely free of dictation from private and commercial interests.

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The Workmen's Compensation Act in Illinois

The State of Illinois has done much pioneer work in the matter of testing the advisability and efficiency of a workmen's compensation law. For some time past, the mine operators and mine workers of Illinois have been given the opportunity of signifying their choice of whether they would operate and work under a law providing a just compensation for time lost on account of injury to the workman in the performance of his duties in and about the mine.

In framing the law, every care was taken that its provisions should not be drastic. It was not desired to inaugurate a paternalism in the system of state government that would make the mine operator responsible for actions of every nature. Neither was it desired to shift the responsibility from the mine worker to his employer, regardless of the questions of carelessness and neglect on the part of the worker.

Industrial accidents may, in a general way, be classified under two heads:

First, accidents arising from improper or badly designed machinery and equipment, or improper regulations relating to the safety of the operative or worker. For this class of accidents, the employer is or, justly, should be held responsible.

Second, accidents arising from the neglect or carelessness of the workman. It is generally agreed that the responsibility for this class of accidents rests wholly on the worker. The neglect of the worker to take proper precautions for his own safety or to obey the regulations and instructions of his superintendent or foreman, has a broad bearing. Such neglect may be intentional on the part of the worker, due to his own stubbornness; or it may arise from an absent-mindedness on his part; but, in either case, the worker is evidently to blame, and should be held alone responsible for the results of such neglect. Likewise, carelessness, on the part of the worker, makes him alone responsible for the injury resulting therefrom.

There is a class of accidents, however, the responsibility for which is not so clearly defined and regarding which there will always be some difference of opinion. This class embraces those accidents due to the ignorance of the worker. When an injured workman claims, after the accident, that he was not aware of the danger to which he was exposed, the question always arises: Was this ignorance due, in part, to the failure of the employer to make the workman understand the danger; or was it due wholly to the failure on the part of the workman to fully comprehend the importance and meaning of the instructions given? These are questions that can only be settled finally by a careful consideration of the evidence in any case.

In Illinois, the original compensation act has now been modified in many important respects, and the revised act took effect July 1. The official copies of the act have not as yet been issued. By this act, which has been broadened so as to include employees of the state, county, city, etc., and to cover industries not included in the previous act, the various employments are divided into two general classes; namely, "extra-hazardous" and "non-extra-hazardous." As before, the act is made optional; but the employer in an extra-hazardous industry, while not obliged to give notice in order to operate under the new act, is compelled to give such notice in case he desires to reject the provisions of the act. In the case of nonextra-hazardous employments, notice must be given if the new act is either accepted or rejected.

One of the advantages of the act to the employer who elects to benefit thereby, is that having given notice of his willingness to provide and pay compensation for accidental injuries sustained by any employee, arising out of and in the course of the employment, according to the provisions of the act, is thereby relieved from any liability for the recovery of damages, except as provided by the compensation act. The advantage to the employee is that, in case of injury, not only is prompt and efficient treatment afforded the injured man, but he is assured of an adequate compensation for the time lost owing to the accident, subject, of course, to the nature of its cause and the responsibility therefor.

One of the greatest advantages of the compensation act, however, lies in the fact that it "knocks out" both the ambulance-chaser and the pettifogging lawyer, which have long been regarded as well-nigh necessary evils attending every mine accident. The operator is relieved of the great burden of defending himself against lawsuits as numerous as they are unjust in the majority of cases.

One of the prominent features of the revised act is the provision for the appointment by the governor, of an Industrial Board, to be composed of one representative employer, one representative employee, and one representative citizen not identified with either. Under the provisions of the new law, this board takes over the functions of county courts, in respect to the appointment of a third arbitrator and the review of decisions on appeal. Trial by jury is entirely eliminated, and only questions of law, or charges of fraud, can be taken to the Supreme Court.

A Crisis in Connellsville Coke

The Connellsville coke operators and consumers are waging a contest which promises to settle definitely who shall control the coke market in the future. The direct point at issue is the price at which furnace coke for second-half delivery shall be sold. The Connellsville coke trade has been subject to price wars before, but apparently this is the first instance where both sides have been so united and have shown such determination to win.

As is well known, the price of pig iron has been the principal factor in fixing the price of coke, so that as a rule the operators have had little to say in the matter. Theoretically, such a selling basis would seem to be fair to all concerned, since it is simply a matter of supply and demand. But practically this has not proved to be the case. Thus, the operators have frequently contracted at relatively low prices, corresponding to the ruling quotations for pig iron, but have failed to participate in a rise in the latter market. Or, again, when they have succeeded in closing at a high figure, the furnaces have frequently blown out and failed to take the coke, since such is not mandatory, coke contracts usually being made only to comply with the customer's requirements.

Coke operators have recently found that the average selling price at which coke was being marketed has not yielded them the required margin, in view of the high land values. Encouraged by their bankers, who are interested in their bonds and securities, they have stood out unitedly for a price of $2.50 on second-half furnace coke. The average price of last year's contracts, and also a number of those for the current year, was considerably higher than this, while in December of last year, the spot price touched $4 and higher. As the market eased off through the early part of this year, the operators fixed upon $2.50 as the minimum at which they would contract.

During this time the pig iron market was steadily declining, until it touched $15 at eastern Pennsylvania furnaces and $14 at valley furnaces for foundry pig iron. It is, of course, true that such prices do not justify $2.50 for coke, but the operators rightly contend that the furnace men were fully informed that this would be the minimum in the future and, knowing this, they should not have permitted the iron market to reach such a low point. Considering that they have deliberately ignored warnings to this effect, it is clear that the responsibility rests entirely with them.

As regards the tonnage involved, the operators estimate that contracts aggregating 175,000 tons per month expired June 30. During the last few days of June a compromise was effected, covering about 90,000 tons of coke for July delivery only, at $2.50; most of these sales carried a clause guaranteeing the price against decline. The remaining 85,000 tons are still to be covered and furnace men insist that they will shut down tight rather than pay the price the operators are demanding; we are informed on good authority that four or five furnaces actually were blown out early in July. The coke operators are equally determined in their position in the matter, and are likewise shutting down ovens, keeping only a sufficient number burning to meet contracts already made.

One of the chief difficulties in the situation is the unbalanced financial condition of the different operators. Many of the older companies secured their land at low prices and have practically wiped this cost off the books On the other hand, the newer ones bought in at relatively high figures, sometimes as high as $1500 per acre, and we believe even up to $2000. These latter have in most cases been bonded at approximately the cost of the land, in order to obtain the money required for development. The buyers at these high prices justify their investment on the grounds that the life of the Connellsville region is now limited to between 20 and 25 years, and there are no other known coals making such a perfect coke. Close observers, however, have noticed that the increased demand for coke in recent years is being covered with byproduct ovens, using but a small amount of Connellsville coal. Thus the market has not shown a disposition to yield to the high margin of profit which is now economically essential to most of the operators in the Connellsville region.

This is clearly shown in the following example, the assumed figures for which are exaggerated: An operation has two acres of coal per oven, and each oven has a maximum capacity of 700 tons per annum, the life of the plant thus being 20 years, on the basis of a recovery of 7000 tons of coke per acre. If the land were acquired at $1500 per acre, and the operation bonded for an equal amount, the total investment would be $4000 for each two acres with one oven. With interest at 5 per cent., amounting to $150 per annum, and $200 a year to be charged off for exhaustion and amortization, this makes a total of $350 to be carried by 700 tons, or 50c. per ton.

Possibly in some of the best years in the Connellsville coke market, such returns have been effected, but certainly not over an average of a number of years. As a matter of fact, prices have more frequently ranged around a level that would give a profit to only such operations which have neither bonds, interest, or exhaustion charges. Hence we see the reason for the determined stand of the operators in the matter of $2.50-coke. It may be rightly said that the Connellsville acreage should never have been priced so high. Obviously, this appears only too true, but we are now confronted with a condition and not a theory.

SOCIOLOGICAL DEPARTMENT

The Fourth of July at Gary, W. Va.

By An Eye-Witness

SYNOPSIS—The United States Coal & Coke Co. used the occasion as has been customary with them to advance the interests of safety, to promote patriotism, to develop a cordial feeling between themselves and their men, to knit the community in a bond of fellowship, to encourage the local fire-fighting forces, to promote a kindly interest of drivers for their mules and to enliven the dull routine of a line of mining camps which are shut in closely in narrow valleys between forbidding hills.

The United States Coal & Coke Co. made the Fourth of July Celebration at Gary, W. Va., an opportunity for laying stress on "safety first." If this practice became common perhaps the Fourth of July might place against its terrible reputation for the destruction of life an honorable record as a promoter of safety and human welfare.

The celebration was ably managed by Col. E. O'Toole, general superintendent of the United States Coal & Coke Co. All civic societies were invited and the parade was as follows:

1. Verhovay Sick Benefit and Burial Association, Gary, W. Va.
2. Verhovay Sick Benefit and Burial Association, Filbert, W. Va.
3. First Tug River Sick Benefit and Burial Association, No. 1, Filbert, W. Va.
4. First Tug River Sick Benefit and Burial Association, No. 2, Thorpe, W. Va.
5. Count Bathtyani Sick Benefit Association, Gary, W. Va.
6. Count Bathtyani Sick Benefit Association, Filbert, W. Va.
7. Gary Lodge of Odd Fellows with band of 14 pieces and 48 members in line.
8. Tug River lodge of Odd Fellows with band of seven pieces and 30 colored members in line.
9. United Supply Co.'s decorated float with Sunday-school children.
10. Contestants in ball game between Gary and Huntington, W. Va.
11. United States Coal & Coke Co.'s Mine No. 2, near Kennon, marshalled by Superintendent J. M. Tulley, a float representing a mine drift, followed by the first-aid corps, and 28 mules ridden by their drivers dressed in comic costumes representing the nationality of each, the marshal of the cavalade being the stable boss. The mules were caparisoned in muslin with "First aid" in gold letters.
12. Sawmill department with large log float 12 ft. long, 4 ft. thick, drawn by eight large mules, decorated with bunting. Woodsmen in the rear.
13. No. 3 plant marshalled by C. G. Seaton, the superintendent, was led by a horseless carriage pushed by a mule draped in all the colors of the rainbow and marked as generating 100,000 mule power. This took first prize. All the drays at No. 3 followed carrying the sanitation, machine and carpenter's shop employees, and behind these a float of a model miner's house with J. D. Jennings, master mechanic in charge. Then followed a float with the Sunday-school children and 12 mules in working harness followed by No. 3 coke workers.
14. Plants Nos. 4 and 5 marshaled by A. N. Harris, superintendent, with United Supply Co.'s float in the lead. All the workers from these mines, American, white and colored and foreign, were in line with their wives and 22 mules gaily draped. A float with Sunday-school children brought up the rear.
15. Plant No. 6 marshalled by Neil Freil, superintendent, with a wagon load of school children and their teachers. Then the first-aid corps with a patient in bed swathed in bandages and 35 decorated mules and their drivers making a striking cavalcade.
16. Plants Nos. 7 and 8 were officered by F. A. Kearns superintendent, with merrymakers marching to the tune of "Dixie." The children of No. 8 carried a banner inscribed, "$358,780 paid in pensions last year—Safety first." A float of school children and a United Supply Co. float proclaiming pure food then followed. A banner brought up the rear inscribed, "$750,000 paid out last year for Safety first."
17. W. W. Harding, of No. 9 mine, expected to carry away the prize as always before. He had 30 lively mules tricked up in bunting and mounted by as many drivers. Then followed a float of well-dressed Sunday-school children, and another worthy of special mention showing a mine-room face with coal shot down and a man loading a car. The Supply company also furnished a notable float.
18. Plant No. 10 was marshalled by Superintendent Booth, with a Hungarian band of 16 pieces, a float of Sunday-school children and another with 25 fine mine mules without a scratch on any of them, and all dressed in comic costumes.
19. Plant No. 11 was marshalled by I. H. Dunn, the superintendent, and was represented by a float filled with school children followed by miners carrying flags, 39 fine mine mules, a float of the United Supply Co., filled with clerks and drawn by four large mules decorated in five colors, a farm wagon filled with "country people," and an inscribed banner.
20. H. T. Graham, the superintendent of mine No. 12, and his corps of officials tried to carry off the honors with 200 native, foreign and colored miners with 75 school children, all carrying lettered cards spelling repeatedly "Safety first." A band brought up the rear. This exhibit of mine No. 12 was especially noteworthy.
21. In the rear of the procession was an assemblage of all nations, the participants being those who had not been placed in other parts of the parade owing to their late arrival.

The program for the day was as follows:

1. Empire Theater—Moving pictures and vaudeville.
2. 10 a.m. Ball game, Gary versus Huntingdon, for a prize of $25.
3. 11:30 a.m. First-aid contest. All teams invited.
4. 1 p.m. 100-yd. dash. Prize $5; 50-yd. dash, open to boys under 16 years of age, prize $2.50.; 25-yd. dash, open to girls, prize $2.50; potato race, open to all, prize $2.50; sack race, open to all, $2.50; wheelbarrow race, open to all, $2.50; greased-pig contest, prize the pig; greased-pole contest, prize $5; society with most men in parade, $25; society with second largest number of men in line, prize $15; best double-mine team, prize $10; second best double-mine time, prize $5; third best double-mine team, prize $3; each driver must have driven his team at least a month; best float prize, $15; second best float, prize $10; third best float, $5; most comic "get up" not in the nature of a float, $5; tug of war, Sandy Lick versus Tug River (6 men on each side), prize $12; contests between fire departments, prize $10.
5. 2:30 p.m. Ball game, No. 6 Gary versus Tazewell, colored; prize $15.
6. 4:30 p.m. Herbert bicycle act, free.
7. 9 p.m. Fireworks at Gary.

The parade assembled at 8 a.m. and marched for inspection at 10 p.m., and took an hour to pass the stand. The judges were J. C. Herndon, J. Horne, E. G. Callahan, of Uniontown, Penn., and L. Blenkinsopp The first-aid contest was in charge of Vitus Klier, chemist; S. J. Price, foreman of U. S. Rescue Car No. 7; J. C. Herndon, J. Horne, E. G. Callahan and L. Blenkinsopp, mine inspector 11th district. J. R. Fleming and C. H. Brown, of the Bureau of Mines, took moving pictures of the parades. They are preparing pictures of the working conditions in the mines of the United States Coal & Coke Co. to serve as illustrations of necessary safety precautions in mining work.

It is estimated that there were 5000 people on the field. With all the excitement no one was injured. A dash of rain did make matters unpleasant for a while, but otherwise nothing occurred to mar the pleasure of the day.

Powder Regulation in the State of Washington

By Ralph W. Mayer*

A disastrous explosion, caused by a child sticking a red-hot poker into a keg of powder, wrecked a dwelling house, killed the inmates and caused the Washington legislature to pass a law prohibiting the storage of kegs of powder in homes. This caused the coal-mining companies to build small powder houses from which daily supplies could be issued to the mines.

The Northwestern Improvement Co., of Roslyn, sells powder checks at the store. Each check is good for a quarter of a keg of powder. A man starting work buys two powder cans at a merely nominal price, each holding a quarter of a keg or six and a quarter pounds of powder. He presents his empty powder can and one powder check at the powder house and in return gets a full powder can. The miner has two cans and every time he takes a full can out of the powder house he returns an empty, which is filled during the day so that it will be ready for the next shift.

If any of the cans become damaged by rock falls or in any way except by gross carelessness, the company gives the miner a new can free of charge. Clerks from the stores are stationed at each of the powder houses for one hour before each shift goes to work. They simply exchange the full canisters for the empty ones and take the powder checks in payment for the powder.

The Cans Are Not Filled by Clerks

They do not handle the loose powder or fill the cans. During the day a man chosen for his carefulness and steady habits rides from one powder house to another and fills the empty cans which the miners have returned.

He uses an automatic filling machine which is part of the equipment of each house. The powder is emptied from the kegs into a large wooden hopper, which discharges through a stationary funnel. The powder can is placed under this funnel and a lever pulled which releases just enough powder to fill the can. As this machine measures the powder out by bulk and not by weight, the can is placed on a small scale placed near the machine and any small inaccuracy corrected, although corrections are seldom necessary.

The powder cans are stored on wooden shelves around the sides of the building. Only enough powder for one day's supply is kept at these powder-distributing houses. Every evening the man who fills the cans turns in an order for the next day's supply for each powder house. The main powder magazines, into which the cans are unloaded, are large stone buildings situated out of the way of danger. The distributing powder houses are comparatively small brick and concrete buildings, one being built at each mine. They are kept scrupulously clean, being swept out every time they are used. They are electrically heated and lighted, and no open lights are allowed near them. A pipe with running water passes a few feet from the door. The powder cans are handed out through a small opening in the iron door of the building. This trap in the main door is hinged at the bottom and can only drop half way down, thus forming a stand or shelf on which the powder cans can be placed while being exchanged. There are no other openings in the building. Only the man in charge is allowed in the magazine.

At present the miners take their empty powder cans home. Sometimes they leave much powder in the cans and this practice is unsafe. It has been suggested that a small trap door be placed in the wall of the powder house with a chute leading from it to the floor so that when the miners come out of the mine they can drop their cans through it into the powder house, thus avoiding the trouble of carrying them home and the danger of having powder in their dwellings. No account would be kept of the powder left in the empty cans as it should not be there. Two men work in each room in the mine and one of them always has a can into which any small quantity of powder can be emptied and not brought to the surface.

If it is considered unsafe to have the opening for the empty cans in the powder house a small addition could be added into which they could be dropped. Every miner has metal checks for putting on his loaded cars of coal. By putting one of his coal checks on his empty powder can and calling for his check number when he wanted a full can, no difficulty would be experienced in tracing the cans.

*Assistant foreman, Northwestern Improvement Co., Roslyn, Wash.

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Another Fourth of July Celebration

In the Fourth of July celebration held at Central City, Ky., in the heart of the western Kentucky coal fields, the most interesting feature was a first-aid contest in which eight teams participated, including one of boys from the mines of the W. G. Duncan Coal Co. Other teams came from the mines of the Central Coal & Iron Co. and from Luzerne, Martwick, Taylor, Crescent, Graham and Powderly.

The contest for first prize was a tie between Crescent and Luzerne, each team making an average of 100; and by a vote of the men the prize was divided between them. The second prize of $30 went to the corps of Central Coal & Iron Co., although this team was considerably handicapped by the eagerness of the crowd to see it work. A special prize was made up for the "Graham Junior" team of the W. G. Duncan Coal Co., as the efforts of the youngsters were thoroughly worthy of special notice.

The judges were Dr. H. Tuldesley, of Central City; G. T. Powell, in command of Government Rescue Car No. 3, and Lieut. Winston Pilcher, U. S. A., retired, of Nashville, Tenn. The committee which arranged the contest was composed of F. P. Wright, Crescent Coal Co.; S. A. Yorks, vice-president, Central Coal & Iron Co.; W. G. Duncan, Jr., W. G. Duncan Coal Co., and L. B. Walker, president District 23, U. M. W. of A. It is planned to hold a much larger meet at Central City on Labor Day, Sept. 1, as 20 teams have already entered, and handsome prizes have been offered by the Kentucky Mining Institute.

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National Conservation Exposition

A national conservation exposition is to be held at Knoxville, Tenn., and the miner's field day is set for Sept. 20. The Bureau of Mines will ship a large steel tube from Pittsburgh and erect it at Knoxville, so that exhibitions can be given demonstrating the explosibility of coal dust. Contests will be held between various teams from Tennessee, Kentucky, Virginia, West Virginia and Alabama, and prizes will be awarded to the most competent teams by the American Red Cross and the Mine Safety Association. The field-day proceedings will be under the auspices of the Tennessee Mine Foremen's Association. At the meeting held at the Imperial Hotel, Knoxville, Tenn., to arrange the meet the following leaders in safety work were present: H. M. Wilson and J. W. Paul, of the Bureau of Mines, from Pittsburgh, Penn.; Major R. W. Patterson, of the American Red Cross from Washington, D. C.; E. F. Buffet, of the Tennessee Mine Foremen's Association from Oliver Springs; E. C. Mahan, representing the coal operators; E. B. Sutton, of the Bureau of Mines, and D. T. Blakely.

DISCUSSION BY READERS

Mixed Lights in Mining

Letter No. 6—Before forming and expressing a definite opinion as to the advisability of using mixed lights in a coal mine, it would be well to carefully determine, as far as possible, the degree of danger attendant thereon. If the danger is within the limits of control, the risk assumed in the use of mixed lights is as justifiable as other risks incident to coal mining and arising from natural conditions.

The bituminous mining law of Pennsylvania (1911) permits the use of mixed lights in a mine generating gas, without specifically stating the conditions under which open lights are permitted, the use of the open lights under these conditions being left to the judgment of the mine manager, subject, however, to the approval of the state mine inspector, who, under the bituminous law, is armed with discretionary power (Art. 20), which I personally consider of a negative character.

When any portion of a mine becomes dangerous, owing to the generation and accumulation of explosive gas, it becomes the duty of the mine management to provide for the safe working of such section or sections of the mine where gas is being generated in dangerous quantity, by prohibiting the use of any open lights therein, except where the gas is generated only at the face of live entries (Art. 10, Sec. 3; and Art. 28, Sec. 2).

In considering the danger attending the use of mixed lights in a mine, there are two conditions that may arise:

First, the open-light section may be adjacent to the safety-lamp section, on the return side of the latter. In this case, even assuming that all the legal requirements are strictly enforced and that the sections are completely isolated from each other as far as ventilation is concerned, it must be admitted that the possibility of disaster still exists. Under these conditions, the greatest danger lies in assuming that the open-light section will remain free from explosive gas, which the facts of experience prove to be a false assumption.

Second, the open-light section may be adjacent to and on the intake side of the safety-lamp section, both sections being ventilated by the same air current. In this case, the danger is as great as that to which we have just referred, while the conditions that favor the spread of a possible disaster are materially increased. My personal experience of the danger attending this second condition enables me to speak with positiveness of its imminence.

I regard the danger incident to the use of mixed lights, in any case in coal mining, to be exceedingly great and beyond the power of control. The practice is based simply upon a pure assumption, and there is no man living, however expert he may be, who is able to make that assumption a positive assurance. *Just as long as we persist in bringing the two factors necessary to an explosion within the range of possible contact, just so long do we place the danger of disaster beyond the limits of control and unjustifiably expose life and property to destruction.* The belief that the strict enforcement of our present mining laws will *restrict* instead of eliminate the dangers of mining, leads to a false feeling of security. The best safeguards of life and property are such precautionary measures as will tend, as far as possible, to *eliminate* rather than to restrict these dangers.

The lax methods of mining operations commonly employed in the United States may be, in part, excusable on the ground that the conditions here are not such as to necessitate the enforcement of more sane and scientific measures. This excuse, however, is rapidly losing favor as conditions change and it is necessary to go deeper for the coal. It is now quite generally recognized that more scientific and practical safeguards and methods are necessary, in order to minimize the dangers that surround the miner.

Another condition that attends the use of mixed lights in the mine and one that greatly intensifies the danger, is the false sense of security that pervades the minds of the workers in an open-light section or mine. Miners naturally look upon the safety lamp as a necessity, only where there is the recognized danger of an explosion occurring. As a consequence, every mine worker is prone to regard a section of the mine where open lights are used, as entirely free from explosive gas. This belief leads to a careless disregard of danger arising from the ignition of gas in this section. Neither the miner nor the mine manager apparently considers seriously the possibility of a so-called non-gaseous section of the mine becoming dangerous at any moment, from the presence of explosive gas. I am convinced, and believe that most practical mining men will concur in the opinion, that the greatest menace to a mine worked by mixed lights, lies in the open-light section. It is my conviction that the use of mixed lights in a mine generating explosive gas is, at least, impolitic and injudicious.

The safety of mine operations is so closely related to the economy of working that a high degree of efficiency in the former instance means a proportionate increase in the latter. The common belief that the largest profits from the least expenditure in mining represent the greatest economy is only theoretically true. In practice, this principle will only hold true for a limited time and eventually fail, because it cannot be carried to extremes without disastrous results.

In reference to safety lamps, it is true that the same production cannot be effected as in the use of naked lights; because the activities of the workmen are curtailed, in a measure, by the dimness of the light. But, on the other hand, the results of working with open lights, in a gassy mine, may prove so disastrous as to more than counterbalance the advantage and profits arising from their use.

In view of the fact that workmen's compensation acts are now receiving much attention from legislators, it may prove a matter of economy as well as humanity, on the part of operators, to safeguard by every practical means the lives of their employees. It is a pleasure to note that

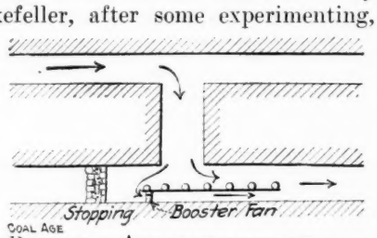
a large number of coal operators are coming to regard the coal miner as something more than a mere physical machine designed for the production of coal.

I. C. PARFITT.

Jerome, Penn.

The Booster Fan

We have used a booster fan to increase the circulation in a portion of our mine where the air was slack. My foreman, G. E. Rockefeller, after some experimenting, has discovered that in using a booster fan, it is much better not to allow all the air to pass through the booster; but to arrange this fan behind a brattice, as shown in the accompanying sketch.



PROPOSED ARRANGEMENT OF A BOOSTER FAN

Some time ago (COAL AGE, Vol. 1, p. 1150) there was started an interesting discussion on the installation of a booster fan to assist the general circulation in a section of the mine where the air was deficient. In that connection, I thought the information might be of value to those who are using booster fans for this purpose.

He first built a good stopping in the entry, just outby from the crosscut through which the air current entered the heading. As shown in the figure, he then erected a brattice extending from a point near this stopping forward a few yards beyond the crosscut. The booster was installed at the end of the brattice nearest the stopping. By this arrangement, the fan was found to do good work, and the current of air discharged from behind the brattice greatly assisted the general current passing up the heading.

M. C. BUTLER, Supt.

Fairfax, Wash.

A Humidity Chart

Regarding J. S. Watson's question, COAL AGE, July 12, p. 62, allow me to call attention to the U. S. Department of Agriculture's publication by the Weather Bureau, Bulletin No. 235, which contains complete psychometric tables for obtaining the vapor pressure, relative humidity and temperature of the dew point, from the readings of the wet- and dry-bulb thermometers. The bulletin can be obtained from the Weather Bureau, at Washington, at a cost of 10c. per copy, and is a fine investment for any student of atmospheric conditions.

DONALD M. LIDDELL.

Elizabeth, N. J.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Having found the heat absorbed by the products, the next step is to find the heat absorbed by the unburned air. Let x = weight of air required to make 1 lb. CH_4 inflammable. Then, since 1 lb. CH_4 consmes 4 lb. O + 13.39 lb. N = 17.39 lb. air, the unburned air is $x - 17.39$ lb. The original temperature of the air being 60° F., the rise is $1200 - 60 = 1140$ deg. and the heat absorbed is $0.2374\ (x - 17.39)\ 1140 = 270.636\ x - 4706.36$ B.t.u., which makes the total heat absorbed

$$8154.3139 + 270.636x - 4706.36 = 270.636x + 3447.9539\ B.t.u.$$

Since the heat absorbed is assumed equal to the heat generated,

$$270.636x + 3447.9539 = 23{,}513$$

and
$$x = \frac{23{,}513 - 3447.9539}{270.636} = 74.17\ lb.\ air.$$

This is the total weight of air required to make 1 lb. of methane (CH_4) inflammable. In other words, the weight ratio of gas to air, at the lower inflammable limit, is 1 : 74.17; But since the specific gravity of methane, referred to air as unity, is 0.559, the volume ratio of gas to air, at this point, is $1 : 0.559 \times 74.17$; or 1 : 41.46. That is to say, a mixture of pure methane and air first becomes inflammable when 1 volume of this gas is mixed with 41.46 volumes of air.

The percentage of gas in this mixture is

$$\frac{1}{1 + 41.46} \times 100 = \frac{100}{42.46} = 2.3\ per\ cent.\ CH_4$$

Lower Explosive Limit—The continued addition of air to methane causes the firedamp mixture to become more and more inflammable till a point is reached when the combustion of the gas is so rapid that the mixture is explosive. As this condition is approached, in practice, owing to the mixture of the gas and air not being uniform, the ignited gas often snaps and cracks in the combustion chamber of a safety lamp.

In the same manner, an accumulation of firedamp, in the mine, when ignited, may burn with greater or less energy or violence and small explosions may occur here and there, followed perhaps by the general explosion of the entire body of the firedamp. The explosion depends not alone on the proportion of gas and air in the mixture, although that is important, but on the intensity and volume of the igniting flame. Thus, it happens that a firedamp mixture ignited in the narrow confines of the mine workings may, after burning for a brief period with more or less energy, suddenly develop a violent explosion.

The lower explosive limit of pure methane has been determined, by experiment, to occur when 1 volume of the gas is mixed with 13 volumes of air; or the percentage of gas in the mixture is

$$\frac{1}{1 + 13} \times 100 = \frac{100}{14} = 7.14\ per\ cent.$$

This limit, however, is considerably modified by any conditions that tend to increase or decrease the amount of heat developed.

The Coal Age Pocket Book

Maximum Explosive Point—The maximum explosive force of a combustible gas is developed when the proportion of gas to air is just sufficient for complete combustion. If the gas in the mixture is in excess of this proportion the full heat energy is not developed, owing to the incomplete combustion of the gas. On the other hand, if the air is in excess of what is required for complete combustion, the unburned air absorbs a portion of the heat generated by the combustion, which thus becomes latent.

The maximum explosive force of methane is developed when the proportion of gas to air is 1 : 9.57. It is calculated in the following manner: Write, again, the chemical equation expressing the reaction that takes place when this gas burns in oxygen, forming carbon dioxide and water: thus,

$$CH_4 + 2\ O_2 = CO_2 + 2\ H_2O$$

Molecular volumes, 1 2 1 2

It should be observed that when the symbol of each gas is written as a molecule (oxygen = O_2) the prefix or number written before the symbol, indicating the number of molecules of that gas taken, shows also the relative volume of the gas concerned in the reaction; because the volume of all gaseous molecules at the same temperature and pressure is the same.

The above equation shows that two volumes of oxygen ($2O_2$) are required to completely burn one volume of methane (CH_4); and there are formed one volume of carbon dioxide (CO_2) and two volumes of water ($2\ H_2O$).

But, oxygen forms 20.9 per cent., by volume, of the atmosphere. Therefore, when methane is burned in air, the volume of air required to completely burn two volumes of the gas is

$$\frac{2\ volumes}{0.209} = 9.569,\ say\ 9.57\ vol.$$

Hence the proportion of gas to air that will develop, in explosion, the maximum force is 1 : 9.57. The percentage of gas in the mixture, at this point, is

$$\frac{1}{1 + 9.57} \times 100 = \frac{100}{10.57} = 9.46\ per\ cent.$$

Higher Explosive Limit—The continued addition of air, after the maximum explosive point is reached, causes the explosion of the gas to be less and less violent as the volume of air is increased, till finally a point is reached where the gas is so diluted with the air that explosion ceases and the mixture is simply inflammable. The point at which explosion ceases is called the "higher explosive limit." For pure methane, this point is practically reached when the proportion of gas to air is 1 : 5, although the position and character of the igniting flame may vary this proportion slightly. The percentage of gas in the firedamp, at this point, is practically

$$\frac{1}{1 + 5} \times 100 = \frac{100}{6} = 16.67\ per\ cent.$$

INQUIRIES OF GENERAL INTEREST

Coking and Steaming Coals

What are the qualities or constituents of a grade of coal that would be termed a "good coking coal"; and what are the qualities and constituents of a good "steaming coal?"

What is the lowest percentage of fixed carbon in a coal that would be considered as a coking coal; and what is the highest percentage such a coal may contain?

C. A. PEARSON.

Duluth, Minn.

It is only possible, in the most general way, to name the qualities that are essential to a good coking coal. Such a coal will generally contain from 15 to 30 per cent. of volatile matter. An important property of a coking coal is that on being heated the coal passes through a semifused or pasty condition and the hydrocarbon gases driven off while the coal is in that condition render the mass highly porous. When the coal contains too small a percentage of volatile matter, it will not fuse readily; while too large a percentage of volatile matter will develop too great a porosity and the resulting coke will not have sufficient strength for the purposes for which it must be used.

It is not possible to state any limiting percentages of fixed carbon that would determine the coking qualities of the coal. While many attempts have been made to ascertain on what the coking properties of coal depend, nothing definite has been determined further than that the relation between the volatile matter and the fixed carbon, or, preferably, the relation between the hydrogen of the coal and the fixed carbon is important. A good coking coal must also contain a low per cent. of ash; and, for many purposes, the sulphur content must be less than 1 per cent.

The physical properties and condition of the coal are now believed to be of more importance than is generally understood, in order to produce a good merchantable coke. A coal having a free vertical or jointed structure will generally produce a better coke than a coal having a laminated or bedded structure. Crushing the coal greatly improves its coking qualities; and some coals that would not coke otherwise have been made to produce a fair coke by crushing to a fine uniform grade, which permits a more regular and uniform escape of the gases and assists the formation of the porous structure that is such an important feature of a good coke. The percentage of fixed carbon, in some of the best coking coals, varies from 50 to 75 per cent., while the carbon-hydrogen ratio has been found to vary from about 20 to 14 or even 12, in some coals that have been coked.

The qualities of a good steaming coal will depend very largely on the style of boiler used. In many of the long cylindrical and flue boilers that are still used in a large number of mining districts, it is necessary to employ a free-burning, long-flaming coal to produce the best results. Many tubular boilers cannot be fired to advantage with a highly bituminous coal, for the reason that the small tubes of the boiler require too frequent cleaning to prevent them from being clogged with the soot deposited in them. The present practice, however, is to enlarge the size of the tubes of these boilers.

Many power plants are today using hard (anthracite) coal to avoid the too frequent cleaning of the boiler tubes that is necessary when using softer coal. The higher price of the hard coal, however, makes its use prohibitive in most mining plants, except those located in the hard-coal region. Almost without exception, the smaller sizes of coal are used for steaming purposes at the present time, the larger sizes, from chestnut up, being used for domestic purposes.

An Inclined Plane Difficulty

We are lowering coal over an incline 5000 ft. long and having a grade varying from 15 to 47 deg. We use an 8-ft. double drum, having two brakes on each drum; but the friction is so great as to wear away 2¾ in. of wood in 18 days. Can you suggest something of advantage?

M. K. MARLOWE.

Block, Tenn.

From the brief description given, we believe that the weight of the loaded cars is too great and should be counterbalanced by a counterweight or balance-truck, running on a separate track; or the weight of the empty cars ascending the plane should be made to counterbalance the weight of the descending loaded cars. If a balance-truck is used, the counterbalancing weight should always be sufficient to draw up the empties but not so great but that it can, in turn, be drawn up by the loaded cars descending the incline. The counterbalancing of the weight of the loaded cars, in this manner, will relieve the load on the drum and reduce the wear on the brakes holding the drum.

A Hoisting Problem

If one rope of a double-compartment mine hoist is 5½ in. short and the other rope 3 in. long, how will you arrange these ropes so that the cages will reach their respective landings at the same time?

JOHN NELSON.

Des Moines, Iowa.

In general mine practice, in a double-compartment hoisting shaft, the ropes supporting the two cages are so arranged that one rope will wind on the drum as the other winds off, a single drum being used. In this way, one cage is hoisted while the other is being lowered. In the present case, as we understand the question, one rope being 5½ in. short and the other 3 in. long, there is a difference of 2½ in., which is the actual shortage when one of the cages is brought flush with the landing. It is then only necessary to lengthen the rope supporting the other cage 2½ in.

EXAMINATION QUESTIONS

Mine Rescue Work

(*Answered by request*)

Ques.—How would you render first aid to a person overcome by mine gases?

Ans.—Place the patient on his back with something under the shoulders to throw up the chest. Loosen the clothing around the throat and pull out the tongue. Perform artificial respiration by the Sylvester method as follows: The operator kneels at the patient's head, grasps his arms just below the elbows and draws them gently but steadily outward and upward, holding them as far above the head as they will go for about two seconds. He then brings the arms down with the elbows bent, until they press lightly against the chest, holding them there for about two seconds. The operation should be repeated about 15 times per minute. After natural respiration is begun, apply the pulmotor, if one is to be had. In a case of gas poisoning use the pulmotor at the start. A pulmotor should form a part of the first-aid equipment in every mine where gas is generated or where electrical power is installed.

Ques.—How should a person be treated who is suffering from mine burns?

Ans.—Send for a doctor. Raw, blistered surfaces should be protected from the air. If the clothing sticks, do not peel it off but cut around it. The adhering cloth or a dressing of cotton or other soft material applied to the burned surface, should be saturated with picric acid (0.5 per cent. solution). If this is not at hand, coat the spot with a paste of flour and water or a heavy oil, such as machine oil, vaseline, linseed or olive oil. Cover the dressing with cotton, gauze, lint, clean waste, a clean handkerchief or other soft cloth held lightly in place by a bandage. The same coverings should be lightly bandaged over a dry, charred burn, but without wetting the burn, in this case, or applying oil to it. Do not open blisters.

Ques.—A man is found unconscious with a live wire lying across his lower legs Assuming that the current is to be short-circuited first, should this be done at a point between the victim and the power house, or at a point on the other side of the victim from the power house? State fully if there is any difference in the two methods.

Ans.—The effect on the man will be the same whether the current is short-circuited between the power house and the victim, or on the other side of the victim from the power plant. It will always be better, if possible, to flip the wire off the man's leg with a dry stick or other nonconducting material, since this will avoid the possibility of an induced current passing through the man when the switch, or circuit-breaker, is thrown open at the power house, owing to the current being short-circuited. If there is a circuit-breaker on each of the lines ("double-pole breaker"), this would not occur; but, with a "single-pole breaker," there is danger of a possible "field discharge" from the generator further injuring the man, since such a field discharge would raise the voltage throughout all the wires in the circuit, no matter where the "short" is placed.

The reason that the current may be short-circuited on either side of the man with equal advantage, is that the drop in potential caused by the "short" will be practically the same on both sides of the victim, assuming the distance between these two points is small as compared with the length of the circuit and therefore negligible.

Ques.—Give in full the method of artificial respiration to be employed and any other conditions of treatment necessary in case of electric shock.

Ans.—The method of artificial respiration and treatment recommended by the Commission on Resuscitation from Electrical Shock, as explained in a pamphlet issued by the National Light Association, New York, is briefly as follows:

Send for the nearest doctor; but, without waiting, as soon as the victim is clear of the live conductor, quickly feel with the finger to see that there is no obstruction in the mouth, removing any tobacco, or false teeth found there. Then, without stopping to loosen the patient's clothing, begin artificial respiration at once as every moment is precious.

Turn the patient on his stomach, with arms extended and face turned to one side so that the nose and mouth are free for breathing; and, if possible, have an assistant draw the tongue forward. Kneeling astraddle the man's thighs and facing his head, press the loins (muscles on the small of the back) with the palms of the hands, the thumbs nearly touching each other and the fingers spread over the lowest ribs.

Now, holding the arms straight, swing slowly forward so that the weight of the body is thrown gradually upon the victim. This operation should take from 2 to 3 sec. and must not be violent as internal organs may be injured. Then, immediately swing backward so as to remove the pressure, but leave the hands in place, thus returning to the first position. After 2 sec. again swing forward, repeating these operations slowly and regularly at the rate of 12 to 15 times a minute, making the double movement of compression and release in from 4 to 5 sec. Follow your own deep breathing as a guide, swinging forward with each deep expiration and backward with each inspiration.

Continue this operation without interruption until natural breathing is restored or until the physician arrives. During this time, keep the patient warm with proper coverings and by laying hot-water bags or bottles beside his body. Give no liquids whatever, by mouth, until consciousness is restored.

If there are any burns, they should be attended to after natural respiration is restored. These should be treated the same as other burns, by the application of flour, oil, or vaseline to exclude the air. An emulsion of boiled oil and lime water is good.

COAL AND COKE NEWS

Washington, D. C.

An important feature of the report of the Interstate Commerce Commission regarding transportation conditions in New England in general and on the New Haven road in particular, issued during the past week relates to special inquiries made by it with respect to coal and the conditions under which that article is transported. On that point the Commission says:

We find that class rates in central freight association territory are distinctly lower than in New England, especially on classes 5 and 6. These two classes move a very large amount of carload traffic, being the two classes which apply very generally to carload business. Class rates from New York and Boston to New England points are about the same as those from New York and Pittsburgh into trunk line territory.

Class rates from interior New England points appear to be rather higher than corresponding rates in both trunk line and central freight association territories.

We have also instituted a comparison between rates from these same points on three or four of the principal commodities.

Coal is not produced in New England, but is extensively consumed. Coal rates from the various seaports of New England to near-by interior points are uniformly high as compared with rates for similar distances in the other territories under consideration. Rates to more distant interior points are not so extravagant and are often low. The reason for this appears to be that coal reaches the various ports of New England by water and is from thence distributed by rail. This water-and-rail route competes with the all-rail route, and the purpose of these high rates to near-by points is to maintain the all-rail rate.

Allowable Deductions

In issuing the final draft of its revision of the income tax section of the new tariff the senate Finance committee during the past week made some concessions to mining interests designed to eliminate or break the force of criticisms that had been passed upon the new act by operators of mining properties. Under the new acts a corporation which makes income returns is allowed to deduct among other things:

All losses actually sustained within the year in business conducted by it within the United States and not compensated by insurance or otherwise, including a reasonable allowance for depreciation by use, wear and tear of property, if any, and in the case of mines a reasonable allowance for depletion of ores and all other natural deposits not to exceed 5 per centum of the gross value at the mine of the output for the year for which the computation is made.

HARRISBURG, PENN.

From a decision of Judge Mestrezat of the Pennsylvania Supreme Court, work of mine foremen is covered by statute and aside from the duties imposed upon them by law, they cannot be held liable for an accident when the company is charged with neglect.

This question was raised when the commission to codify the mine laws was at work, and it was claimed the statutes were written in the interests of the operators. It was pointed out that one sentence in the law would prevent mine workers from recovering damages inasmuch as it specified that in those mines where electricity was used, responsibility for safeguarding the lives of the workers would be placed upon a certified electrician. This feature was considered a snake and was bitterly fought.

The decision in part states:

That a mine foreman is responsible only for those duties covered by the statutes and where he exercises authority which is not covered by statute, he is going beyond his jurisdiction and through the neglect of the coal company which is not providing proper safeguards, the company is responsible for damages.

The decision is far reaching in the effect it will have on future damage cases, wherein employees may have been injured or killed. It upsets the custom which has been established, making the mine foreman responsible for accidents in mines. According to the opinion, that official must look after the care of the mines and see that the mine laws are observed. He cannot become an agent for a coal company to evade responsibility, where it can be shown that it has not made its mines reasonably safe from accidents.

Receivers Appointed

Judge Orr of the United States Court at Pittsburgh July 9 appointed receivers for the six bituminous coal companies of Pennsylvania which were subsidiary companies of the American Water Works and Guarantee Co., which passed into the hands of a receiver on the failure of First-Second National Bank of Pittsburgh and which was one of the big "Kuhn enterprises."

The Court appointed as receivers for the Isabella-Connellsville Coke Co., S. A. Gilmore, J. D. O'Neil and Wm. K. Johnson for the Naomi Coal Co., Thurston Wright, Samuel A. Gilmore and Wm. K. Johnston; for the Somerset Smokeless Coal Co. Robert P. Watt, Samuel A. Gilmore and Wm. K. Johnson; for the United Coal Co. James D. O'Neil, Thurston Wright. Wm. K. Johnson and Robert P. Watt; for the Pittsburgh and Baltimore Coal Co., James D. O'Neil, Robert P. Watt and Wm. K. Johnson; for the Merchants Coal Co. of Pennsylvania, Robert P. Watt, Thurston Wright and Wm. K. Johnston. The bond for each of the receiverships was placed at $15,000.

The defendants all joined in the petition for the receivership. The bill in each case sets forth that the petition for the receiverships was filed for the purpose of protecting the property and assets of the companies on account of the debts due.

Judge Orr in appointing the receivers made an order which allows them to pay the miners of the United Coal Co., Pittsburgh and Baltimore Coal Co. and the Somerset Smokeless Coal Co. a total of $100,000 in wages.

J. S. Kuhn and W. S. Kuhn were president and Vice-President of the United Coal Co. which controlled the other coal companies.

No Extra Session

Governor Tenor is reported as stating on July 8 that he had not thought of calling an extra session of the legislature, either this summer or the fall after the election. For some weeks rumors have been current that it was the intention to reconvene the general assembly to act on an "Employers' Liability" and other bills and in the event of the constitutional amendment permitting the state to issue $50,000,000 of bonds for consruction of highways, to summon the legislature to pass enabling acts so that bonds might be issued next year instead of waiting until the session of 1915. The Governor said in part.

I know of no contingency demanding the convening of the general assembly in extraordinary session nor shall I call an extra session should the constitutional amendment for the bond issue for road construction be ratified by the people at the November election.

PENNSYLVANIA

Anthracite

Harrisburg—The Governor has approved a legislative resolution authorizing the Chief of the Department of Mines to investigate conditions and operations of quarries, ore and clay banks, ore and graphite mines, oil and gas wells drilled through coal measures, and to suggest needed legislation to the Governor for presentation to the legislature of 1915.

Wilkes-Barre—The Susquehanna Coal Co. has filed appeals from the assessment and valuation of its coal and surface property as fixed by the Board of County Assessors in Newport, Nanticoke and Plymouth Townships. This is the first of appeals to be taken by a coal company to the new triennial assessment for the year 1913, as recently completed by the Board of County Assessors. All the other coal companies are expected to file appeals soon and the entire assessment will again be threshed out in the courts.

Scranton—Three men were killed recently by falling down the shaft at the Brisbin Colliery of the Lackawanna Coal Co., a depth of about 600 ft. The men were employed at the head of the shaft, taking care of the cars coming from the mine.

Philadelphia—Headquarters have been opened to prepare plans for the entertainment of the mining men who are expected to visit Philadelphia as delegates to the sixteenth annual session of the American Mining Congress which meets on Oct. 20-24.

Committees from the Chamber of Commerce are daily holding meetings to arrange for the transportation and care of the visitors.

Permanent quarters were recently opened in the Land Title Building by J. F. Callbreath, the secretary of the Min-

ing Congress and Assistant Secretary E. L. Wolcott, both of Denver. The local finance committee of the Chamber of Commerce of Philadelphia of which E. T. Conner is chairman, and N. B. Kelley, secretary met yesterday to estimate the funds which will be needed for the entertainment of those attending the convention. It is expected that about 1500 mining engineers and experts will attend the convention.

Pottsville—The Supreme Court of Pennsylvania July 9 handed down an opinion that "robbing pillars" in the mining of coal is perfectly legal. The issue was fought out in a case "Streng vs. Buck Run Coal Co.," of Pottsville, who had asked for an injunction to restrain the above company from mining certain pillars on lands leased from the Strengs.

Judge Brumm, of the Schuylkill County Court decided that all pillars may be robbed "except those necessary for the present and future working of the mine." He also decided that the panel or "gob" system of mining is superior to the pillar system, and the Supreme Court has sustained him in both decisions.

Bituminous

Johnstown—Strike sentiment cropped out suddenly July 11 in the mines of the Altoona Coal and Coke Co. at Cupon, near Gallitzin, when several hundred men refused to work longer because the company proposed to change from two to three shifts in the main heading. This company is turning out a grade of coke said to be equal to the Connellsville variety and is pushed with orders. It is thought the trouble will be settled soon.

A part of the big coal deal of the Manor Real Estate and Trust Co., of Philadelphia in the Indiana coal field was consummated July 10 when 680 acres of bituminous coal in seven tracts were purchased by that company for $45,000. The land is situated in Green and Cherryville townships in Indiana County, and adjoins lands in Cambria County, for which the same company paid as high as $200 per acre.

Bentleyville—Residents in the northern part of town are becoming alarmed over the fact that crevices are appearing in the land in that particular section, due, it is thought, to the removal of coal. It has been found that wells are hard to find which will supply water all the year round, and many have gone dry. It is thought the removal of coal too near the surface is the cause.

Monongahela—Representatives of the Monongahela River Consolidated Coal & Coke Co., in whose mine 97 men lost their lives in an explosion on Apr. 25, are settling the death claims with the legal heirs. The company is said to be paying the widows with families $2000. The scale runs from this amount down to $500.

WEST VIRGINIA

Charleston—Miners employed at the mines of the Seng Creek Coal Co., on Coal River, who went on strike in violation of orders from the union officials, have decided to return to work rather than sever their connection with the national organization. This follows some vigorous action on the part of the union officials who ordered the miners' local union, at Coal River Siding, to end their strike or surrender their charter.

Judge Henry K. Black, of the Kanawha County Intermediate Court, has issued a call for a special Grand Jury to sit beginning July 17, for the purpose of investigating conditions in the Paint and Cabin Creek coal fields. Governor Hatfield's letter calling upon officers to resign or handle the strike situation is believed to have resulted in this action. The Senate Committee investigating conditions in West Virginia coal-mining regions will probably resume work this week.

Sheriff Bonner Hill recently sent reinforcements to the Ohlney mining camp a Consolidafed Coal Co. property where rioting had broken out and nearly 1000 shots had been fired at the camp from strikers on the hillsides.

Bluefield—Miners at the Mabscott mine, which was the first operation in Raleigh County where work was discontinued in connection with the strike trouble, have returned to work, and other operations affected in a similar manner have likewise resumed active mining.

KENTUCKY

Fleming—The construction of model roads has become an important part of the work of the large coal companies operating in Eastern Kentucky. The Mineral Fuel Co., which is busily engaged in building two or three new towns and opening up a number of new mines, will start work at once on a number of miles of road in and around its towns and properties. Three miles of fine road, suitable for automobile traffic, will be constructed between Fleming, the first of the company's towns, and McRoberts, on the property of the Consolidation Coal Co., the two companies dividing the expense. The latter company has already built about twelve miles of roads in and around McRoberts and Jenkins.

Louisville—Kentucky mines will be among the first visited by the mine sanitation section of the U. S. Bureau of Mines, which has been organized for the purpose of investigating the conditions of mining in the various states, and determining the standards of living among the miners as well. The newly-developed sections of Eastern Kentucky will be visited, but it is expected that the bureau will find conditions in and around McRoberts and Jenkins, where the Consolidation Coal Co. has its mines, to be rather above the average, as this company is one of the most advanced in the state in its methods and in the housing and general treatment of its employees.

OHIO

Columbus—The officials of the Lorain Coal and Dock Co. which operates a large coal tract in Belmont County deny the statement that the Lorain Coal & Dock Co., the Y. & O. Coal Co. and the Belmont Coal and Mining Co. will consolidate. Edward Johnson, president of the Lorain Coal and Dock Co. is on a trip to Europe and nothing can be done until his return if any merger is to be effected. The negotiations for the merger of the first two named concerns, which were discussed some tme ago have been dropped.

INDIANA

Shelburn—The Kettle Creek mine, after an idleness of two months, has resumed operations.

Sullivan—A new steel tipple mine to employ 200 men will be sunk on a 700-acre tract near Cass, by Job Freeman, a coal operator of Terre Haute. The new company will be known as the Ayrdale Coal Co. The land involved is surrounded by mines in active operation and is pierced by three railroads. The mine will be just east of the new steel tipple of the J. Woolley Coal Co. at Paxton and is part of the proposed extensive coal development in the south end of Sullivan County.

Evansville—P. O. McKinney owner of a coal mine across the Ohio River at Lockport, Ky., is arranging for a distributing point in this city. His mine has a capacity of more than 1000 tons daily.

ILLINOIS

Sorento—The charges that the C. & A., C. & I. M., C. M. & St. P., and the T. St. L. & W. had arbitrarily advanced freight rates on coal shipments in Illinois, were taken before Chas. F. Gerry, special examiner of the Interstate Commerce Commission. The complainants are the shipping companies with mines at Panama, Coffeen and Sorento, who declared that the new rates mean either the shutting down of their mines or raising the price on coal that would make its sale prohibitive.

Staunton—The hoisting engineer at mine No. 14 of the Consolidated Coal Co. lost control of his engine when hoisting a load of lumber, resulting in the death of one laborer and seriously injuring another. The company explained the accident by claiming that the difference in weight between the lumber and a load of coal is so great, that the engineer, not knowing what the cage was loaded with, proceeded as he always had in hoisting coal, and the engine got beyond his control.

Peoria—A new state law provides for the abolition of the institution known as the county Mine Examiners Board composed of three men in each county, and substitutes therefor a commission of three men for the state, whose duty it shall be to examine and license miners. The Governor has not yet appointed this new board, and under the law every miner now working without a state license is subject to a penalty of from $100 to $500 fine and imprisonment for from 30 days to six months, for each day of the violation. Fortunately, however, this law is not being strictly enforced.

MISSOURI

Joplin—Mine No. 19 of the Weir Coal & Mining Co., which has been shut down since June 12 as a result of an explosion, resulting in one fatality, has been repaired and operations resumed.

ALASKA

Washington, D. C.—A bill authorizing the President to construct a railroad in Alaska and to mine coal in that territory was introduced in the Senate, July 10, by Senator Poindexter, of Washington. For these purposes the President would be authorized to borrow $50,000,000. The bill would provide that hereafter no coal land shall be disposed of except under lease.

FOREIGN NEWS

Calgary, Alberta—An English syndicate has bought a tract of coal land near Canmore, amounting to 8000 acres at a cost of about $2,000,000. It will build a road and expects to be marketing coal in Calgary by October.

Sydney, Nova Scotia—Fifteen hundred miners at Nos. 2, 3 and 4 Collieries, Sydney Mines, went on strike July 8. The cause of the trouble is that no horses are supplied in these mines and practically all the work of placing cars falls upon the miners. An early adjustment of the difficulty is anticipated.

Ottawa, Ontario—The Canadian Government has leased one of the finest coal areas in the world to American interests. This was recently discovered and staked by Dr. Reinhold Hoppe, of Oakland, Calif. It is located in the Province of Alberta, about 200 miles from Edmonton. The area is of great extent, and the coal is said to be an anthracite of a quality superior to the famous Pennsylvania hard-coal deposits.

PERSONALS

E. T. McOlvin has resigned his position as superintendent for the Rich Mountain Coal Co., to accept a similar place with the Marion Gas Coal Co., to take effect July 15, 1913.

William T. Hawkins has been appointed fuel agent on the Missouri Pacific-Iron Mountain system, succeeding W. J. Jenkins, who resigned as fuel agent of the railroad to accept the position of vice-president and general manager of the Consolidated Coal Co.

A. D. MacFarlane has resigned his position as resident engineer of construction at the Bayview Mine of the Tennessee Coal, Iron & R.R. Co., near Birmingham, Ala., to accept a position as chief engineer for the La Follette Coal, Iron & Ry. Co., at La Follette, Tenn.

Frank D. Rash, vice-president and general manager of the St. Bernard Coal Co., has been elected as one of the board of directors of the Kentucky Manufacturers' and Shippers' Association, an organization which has as its object the general betterment of conditions affecting its members, especially in the matter of freight rates.

David Ross secretary of the Illinois Bureau of Labor Statistics for the past sixteen years has resigned to Gov. Dunne. He gives no reason for his action.

After having been unsuccessful in his attempt to have John Mitchell, former president of the United Mine Workers of America, made State Labor Commissioner, Governor Sulzer, of New York, has sent to the Senate for confirmation the appointment of James M. Lynch, of Syracuse, President of the International Typographical Union.

OBITUARY

John Dunn a retired coal operator and one of the best known business men of New Philadelphia, Ohio died at the home of his son John Dunn recently, at the age of 78 years. He was a civil war veteran.

Robert Pettigrew, one of teh best known mining men of the state of Washington, was found dead of apoplexy in the garden back of his house at Roslyn, July 8, after the members of his family had searched for him several hours through the town and the surrounding hills. Mr. Pettigrew came to Roslyn 25 years ago and at one time had charge of the Missouri Pacific coal property in Missouri.

CONSTRUCTION NEWS

McClellandtown, Penn.—The Puritan Coke Co. has under way some extensive improvements at the McClellandtown plant.

Sharpsville, Penn.—The Shenango Furnace Co. has announced that it will build a byproduct coke plant at Sharpsville to furnish its three blast furnaces with coke.

Morgantown, West Va.—The Elkins Coal & Coke Co. will add to the electric equipment of its Colliery, at Bretz, W. Va., a 200-kw. motor-generator set.

Punxsutawney, Penn.—The work of constructing 200 new coke ovens, power house, etc., at the Cascade Coal & Coke Co.'s plant in Sykesville, is going forward at a rapid rate.

Greensburg, Penn.—Within the next month the erection of sixty houses will be begun by the Greensburg Coal & Coke Co., which is opening a new coal works near the Greensburg city limits.

Barnesboro, Penn.—The Cambria Coal Co. will install in its mines, near Barnesboro, a 200-kw. motor-generator set, three 7½-kw. transformers, and the necessary switchboard apparatus.

Toledo, Ohio—A permit has been issued to the New York Central lines here, by the building inspection department, for the erection of a $100,000 coaling station to be built on Detroit avenue on the Lake Shore grounds. The construction contract has been let to the Phillis-Lang Co.

Steubenville, Ohio—The Steubenville Coal & Mining Co., operating the High Shaft, are making some extensive improvements including new steel head frames, cages, etc. It is also installing a pair of Crawford & McCrimmon Co. first-motion hoisting engines. The output will be greatly increased.

Clarksburg, W. Va.—The Central Fairmont Coal Co. is installing a complete electric system in its Snake Hill coal mine near this place. The current will be supplied by the Monongahela Valley Traction Co., and the improvement will reduce operating expenses and add to the dispatch of handling coal.

Bristol, Tenn.—Rapid progress is being made in the work of installing a central power plant in the Lee County coal field by the Electric Transmission Co., which was organized here a few months ago. This concern is now making an expenditure of $800,000 and eventually expects to invest from one to two million dollars.

Birmingham, Ala.—At a cost of $100,000 the Republic Iron & Steel Co. will erect a power-generating plant at East Thomas. This plant will be capable of furnishing sufficient power to supply the furnaces at Thomas and in addition it is planned to generate current to operate Sayreton mines and three other openings in addition to some new operations which have not yet been started.

NEW INCORPORATIONS

Uniontown, Penn.—The National Coal & Coke Co., composed of Uniontown men, has secured a charter.

Harrisburg, Penn.—The Buck Ridge Coal Mining Co. of Philadelphia, has filed notice of an increase of its capital to $600,000.

Roanoke, Va.—The Stone Mountain Coal Corporation has been incorporated with $50,000 capital stock to develop coal lands.

Joplin, Mo.—The Oak Orchard Mining Co. has been organized with a capital stock of $2000 by E. W. Hoffman, A. R. Snyder and J. A. Johnson

Tulsa, Okla.—The Schulter Mining & Coal Co. has been organized here with a capital stock of $100,000. The directors are: N. J. Kampers, A. Campbell and E. R. Perry, all of Tulsa.

Charleston, W. Va.—The Shannon Coal Co., with offices in Parkersburg, and of which H. T. Camden is president, has decreased its authorized capital from $500,000 to $100,000.

Pittsburgh, Penn.—A merger of three Pittsburgh coal companies is seriously contemplated, the Youghiogheny & Ohio Coal Co., the Lorain Coal & Dock Co., and the Belmont Coal Co. The capital of the new concern will be $15,000,000.

Connellsville, Penn.—The stockholders of the Westmoreland Coal Co., at a special meeting approved the proposed increase in the capital stock from $5,000,000 to $6,000,000, and the issue of $1,000,000, seven-year, five per cent. collateral notes.

Cleveland, Ohio—The W. H. Warner Coal Co. of Cleveland, Ohio, has been incorporated with a capital stock of $5000 to deal in coal and coke. The incorporators are Whitney Warner, W. C. Saeger, M. T. Flanagan, John C. Barkley and F. K. Studer.

El Dorado, Ill.—The Crescent Coal & Coke Co. has been incorporated here with a capital of $25,000 with E. H. Chenot, of St. Louis, Josh Anderson, A. M. Bourland and I. N. Bour-

land of this place as incorporators. They will take over the mine about two miles south of here.

Columbus, Ohio—The Blocton Co. has been incorporated with a capital stock of $10,000 by Charles M. Crist, H. A. Shafer and C. L. Laboiteaux. The company is organized to take over a coal mine located near Williamson, W. Va., the output of which will be handled over the Norfolk & Western R.R.

Dover, Del.—Articles of incorporation were filed, July 11, for the Lohman Hold Manufacturing Co., of Pittsburgh, Penn., to manufacture, sell and deal in and with Lohman skylit carbite pit lamps. The capital stock is $50,000 and the incorporators are H. Werner Lohman, Otto F. Lohman and William John Hold, all of Pittsburgh, Penn.

Charleston, W. Va.—The Gage Coal & Coke Co. has been organized with an authorized capital of $150,000, of which $1400 has been subscribed, and $140 paid in. The principal office of this concern is in Pittsburgh, Penn., and the chief works in Barbour County, W. Va. The incorporators are: Henry E. Lineaweaver, A. M. Godfrey, W. H. Foster, J. B. Robbins and C. G. Jones, all of Pittsburgh, Penn.

Charleston, W. Va.—A charter has been issued to the Huddlestone Coal & Coke Co., with principal office and chief works in Sherman, Logan County, W. Va. The authorized capital is $100,000, of which $500 has been subscribed and $50 paid in. The incorporators are: J. A. Huddlestone, of Excelsior; H. M. Bertolet, of Charleston; G. S. Borden, and Dan A. Newhall, also of Charleston, and W. W. Whyte, of Welch.

INDUSTRIAL NEWS

Birmingham, Ala.—The coal operators of Alabama will meet July 26, 1913, on the property of the Roden Coal Co., Marvel, Alabama.

New York, N. Y.—The "Mining and Scientific Press" announces the removal of its New York office to the Woolworth Building, Broadway, Park Place and Barclay Sts., New York City.

Clarksburg, W. Va.—The Rich Mountain Coal Co., of Clarksburg, W. Va., has sold its belongings to the Elkhorn Fuel Co. and the Consolidation Coal Co. is handling the output and managing the property.

Pittsburgh, Penn.—The Hirsch Electric Mine Lamp Co. has opened a Pittsburgh office at 328 Diamond St. This office will be in charge of M. Marks, who will oversee the distribution of Hirsch lamps in the Pittsburgh district.

St. Louis, Mo.—The Polar Wave Ice & Fuel Co. has contracted for its new office building on Olive St., west of Grand. It will be 100 ft. wide by 152 ft. deep, and will be a four-story glazed terra cotta building. The estimated cost will be about $75,000 and it will be the finest retail coal office building in the country.

St. Louis, Mo.—The C. & N. W.'s coal road extending from Benld to St. Louis, will probably be in operation about Oct. 1. It is not known yet in just what way this road will enter East St. Louis, but it is a certainty that the company is figuring on a huge tonnage of coal moving to the Northwest this fall.

Morgantown, W. Va.—J. V. Thompson has purchased three new tracts of Greene County, Penn., coal. He bought 74 acres in Whitely Township at $300 an acre; 40 acres in Morgan Township at $190 an acre, and 25 acres also in Morgan Township, also at $190 per acre.

New Salem, Penn.—More than 800 people attended the celebration at Footedale when the new concrete swimming pool was opened. A band concert and festival, together with swimming contests and other sports rendered the occasion enjoyable to all concerned.

Toledo, Ohio—The giant ore loader at the C. H. & D. docks, East Toledo, was blown against a concrete bumping post, July 5, and almost demolished during a high windstorm which swept over the city in the afternoon. Wilford Oaks who was in the cab was crushed to death when he was thrown from the tower, a distance of 90 ft., and a part of the loader fell on him. The immense crane cost $1,000,000 when built and the damage is estimated at $100,000.

Charleston, W. Va.—Suit was entered July 10, by Mrs. Maud Estep, widow of Cesco Estep, who was killed on the night of Feb. 7 last, when the armored train shot up the strikers' camp at Holly Grove, against the Chesapeake & Ohio Ry. Co., the Paint Creek Colliery Co., the Imperial Colliery Co., the Christian Colliery Co. and Quin Morton as defendant. The plaintiff asks $10,000 damages for the killing of her husband.

Boston, Mass.—Owing to the increase of business in New England of the Schutte & Koerting Co., manufacturers of high-grade bronze, cast iron and steel valves, ejector and steam and water jet apparatus, the Boston office has been moved from 98 High St. to 132 High St., Boston, Mass., where it now occupies a large part of the building on the street floor. For similar reasons the Denver office, formerly located at 1710 Glenmore St., has been moved to the First National Bank Building, Denver, Colorado.

Chattanooga, Tenn.—Objection has been raised by the Chattanooga and Birmingham creditors of the Dayton Coal and Iron Co. to the receivers. The protest has been filed in the United States district court here. It is alleged that the present receivers, H. E. Noyes, former general manager of the company, and Archbald Bowman, of New York, were named at the suggestion of the Dayton Coal and Iron Co. Ltd. and that they therefore are not proper persons to look after the interest of the petitioners in the affiairs of the bankrupt concern.

Salt Lake City, Utah—The Standard Coal Co., of this city, recently concluded a contract with the L. R. Wattis Construction Co. for the building of a road to cost approximately $50,000 from the Coal company's mine in Spring Cañon, Carbon County, to Storrs, a station five miles from Helper. The coal company expects to have its first coal on the market during the last two weeks of October. Over $200,000 of mining machinery is to be installed.

Uniontown, Penn.—The Dillworth Coal Co.'s plant, at Rice's Landing, which has been closed for several months, will likely be reopened within a short time. For the past few days about fifty men have been at work inside the mine cleaning it up. At present sufficient coal is being produced to run the boilers, but it is thought the mine will be running full time within a few weeks. The work is being done by the bondholders who purchased the plant at receivers' sale a few months ago.

Scranton, Penn.—The total shipments of anthracite coal from Pennsylvania last month amounted to 5,970,047 tons as against 6,191,646 tons in June, 1912. The amount of coal on hand and at tidewater and lake shipping ports increased 30,403 tons from 502,626 tons on May 31, to 533,029 tons on June 30. The Lehigh Valley R.R. led in tonnage with 1,183,821 tons. The total anthracite shipment for the first six months of the year was 34,851,854 tons as against 26,096,979 tons in the first half of 1912.

Uniontown, Penn.—The Etna Connellsville Coke Co. instituted suit, July 10, in the Fayette County Court against the Whyel Coke Co. to recover $10,442.62, with interest from June 26 of the present year. It is stated in the suit that the plaintiff made an agreement to furnish the Whyel Coke Co., 67,200 tons of furnace coke during 1913, or 5600 tons per month at $3 per ton. For the first three months the coke was received and paid for by the defendant, then for some unknown reason part of the amount mentioned in the contract was refused and payment was not made on shipment. Suit is, therefore, instituted on the grounds that the Whyel Coke Co. broke the agreement.

Springfield, Ohio—As a result of the sale of the northern and southern ends of the Detroit, Toledo and Ironton R.R., to Otto Bannard and M. N. Buckner, of New York City for the upset price of $1,650,000 it is expected that there will soon follow a thorough reorganization of the company upon a solid basis. At least this is the aim of those at the head of the movement. One of those in a position to know something about the motives in railroad circles said that the first mortgage hondholders and the others interested evidently had an understanding before the purchase of the central division. If this were not true it was pointed out that the men representing the Central Trust Co. would not have bought the line between Lima and Wellston.

Des Moines, Iowa—Several years of commercial warfare against the good name and patents of the Christy Box Car Loader Co. were brought to a close on June 25, 1913, when Hon. Smith McPherson, judge of the Federal Court, rendered a decision holding that the Ottumwa Box Car Loader Co. was infringing the Christy patent. It was further decreed that the defendant the Ottumwa Box Car Loader Co. and its officers, agents and employees, be permanently restrained from the further manufacture, sale or use of the said infringing box-car loader or any box-car loader infringing upon claims 1 and 2 of the patent of the complainant. Following this decree the court denied a motion for a supersedeas bond. This prevents the Ottumwa company from using, making or selling the infringing machine.

COAL TRADE REVIEWS

GENERAL REVIEW

Coal markets are holding remarkably firm in view of depressed conditions. Anthracite is moderately active under a restricted production. Bituminous strong with producers in full control of the market.

The Eastern hard-coal trade is sluggish, the demand coming mostly from New England and the West. The steam grades are in fair condition, except pea, which is going into storage. Companies have few orders, but there is apparently no effort to sell; the partial suspension at the mines has restricted the production to within the limits of the demand.

The Eastern bituminous shippers are concentrating their entire efforts upon filling contracts, and are not looking for any new business. Buyers are beginning to complain about delayed deliveries, which latter are probably due to the coal being diverted to more profitable markets. Contract figures on the West Virginia grades are being well maintained, and indications are that there will be sufficient of a shortage to justify an advance. The better grades are all well sold up, and, while there is some tendency to sag in the spot market, the season's prices remain firm.

In the Pittsburgh district, a better car supply followed the suspension in mining over the Fourth of July holiday, so that production has been slightly heavier. Quotations on slack are much firmer than customary at this period, and other prices are being well maintained, though no premiums are reported. The bank failure in Pittsburgh may so embarrass the Connellsville coke producers, many of whom were relying upon this institution for accommodations, that the operators will be forced to recede from their demand for higher prices. In the adjoining markets, few coal producers are willing to contract over a long period, and it is feared that the heavy crop movement is going to result in a severe car shortage this fall.

Prices in Ohio are holding firm and showing a strong rising tendency; there is an insistent demand from the Northwest, which will probably continue throughout the season, and domestic dealers are beginning to store up to full capacity. Steam consumers are also demanding a heavy tonnage, and production was large last week because of the holidays the last of the week previous, which enabled the railroads to catch up. With the miners again at work in the New River field, the pressure in the West Virginia market will probably soon be relieved. The situation is already showing some improvement, but the dumpings have been light due to the lack of coal, and shippers are apparently about all sold up for the balance of the month.

There is already some stocking in the Middle West in anticipation of an acute car shortage the coming fall; the Eastern grades, particularly, are in heavy demand, but the pressure for Western coals is easing up slightly. Business generally is larger and along broader lines, with coal moving freely and the market showing definite indications of improvement.

BOSTON, MASS.

Soft coal is still strong, but the settlement of the West Virginia labor trouble has tended to relieve the pressure. Tonnages for future delivery difficult to obtain. Prompt market slightly softer. Retail anthracite prices advanced and trade moderately active.

Bituminous—The market here this week is almost featureless. On Pocahontas and New River the situation is quiet, but with prices firm. There is practically no Hampton Roads coal being offered. The shippers are bending their energies more toward getting down coal to load waiting vessels and steamers than in the direction of new business. The miners resumed work in New River on July 7 and a fair output has resulted since that time, although "normal" for this year is said to average less than 60% of capacity for the various mines. The expectation is, therefore, that prices will remain firm on the Southern coals, and that there may be enough of a shortage to warrant returns considerably in advance of the contract figure. The Western and Lake trades are reported in excellent shape and the general outlook is fairly satisfactory from the operators' standpoint.

Georges Creek shippers are also behind on their orders and there is more or less congestion at the Baltimore piers. Steamers have been kept waiting about the same as at Hampton Roads, and there is no let-up in sight. All the interests in that district are doing a large business this year, and at unusually remunerative prices.

The Pennsylvania coals are sagging off a little for spot shipment, but on season orders there is no change. Most operators are still reluctant to sell more than a small fraction of their output, partly through fear of a still shorter labor supply and partly because they hope to realize better prices later. The better known grades are understood to be well sold up and it is difficult to get quotations for deferred delivery.

Anthracite—Notwithstanding that companies are understood to have relatively few orders on their books, there is no apparent effort to place the domestic sizes; the dealers here are for the most part keeping their stocks up the limit of capacity. The retail price was advanced 25c. in Boston on the first of the month on all sizes, making stove now $7.50. This has now been followed in most of the cities, and there is discussion of a further advance in order to cover the new Pennsylvania State tax, which has been handed on by the shippers to the retail dealers. The hard-coal trade in New England is still active, and even the steam sizes are in good request.

Bituminous quotations at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$1.10@1.45	$1.35@1.65	$1.67@1.77	
Philadelphia*	2.35@2.70	2.60@2.90	2.92@3.02	
New York*	2.65@3.00	2.90@3.20	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.85@3.00
Providence†				3.78@4.00
Boston†				3.90@4.10

*F.o.b. †On cars.

NEW YORK

Bituminous movement mostly on contract. One large buyer asking for quotations for the year beginning next April. Market firm but quiet. Anthracite unsettled because of the Pennsylvania State tax.

Bituminous—There is no appreciable change in the local market. The trade is in a good, healthy position, and there has been somewhat of a shortage due to the restricted output occasioned by the holidays over the Fourth of July. There is no improvement in the labor situation, nor any prospects for any in the near future. The car supply has been sufficient, the railroads having had an opportunity to catch up during the holidays.

Supplies at tidewater continue about normal, and there is not much demand in the spot market. The movement is confined almost entirely to contracts, and there are still some inquiries from consumers who have not yet covered. There is also one important buyer sending out inquiries for quotations on a large tonnage for shipments beginning Apr. 1, 1914. The local market is not quotably changed, and we continue prices as follows, with the market firm generally:

West Virginia steam, $2.55@2.60; fair grades of Pennsylvania, $2.65@2.70; good grades of Pennsylvania, $2.75@2.80; best Miller Pennsylvania, $3.05@3.15; George's Creek, $3.25@3.30.

Anthracite—The new Pennsylvania state tax on hard coal has had an unsettling effect upon local market. Some companies are continuing to sell at the regular circular prices, but others are billing their customers for the amount of the extra tax, it being noticed, however, that they are rendering a distinctly separate statement of this account, which would seem to indicate that they desired to be in a position to reimburse the buyers.

The market is only moderately firm, and indications are that it will be duller yet before there is any improvement. Most companies are stocking pea and buckwheat in the steam grades, and there is also some chestnut going into storage. While none of the sizes are in what could be termed "short supply," stove coal probably approaches nearest this condition.

Operations in the mining regions appear to be somewhat better than was anticipated a week or ten days ago. Both

the car and labor supply are only fair. We continue to quote the New York market on the following basis:

	Circular	Individual		
		Lehigh	Scranton	Schuylkill
Broken	$5.00	$4.45@$4.65	$4.50@$4.70	$4.45@$4.65
Egg	5.25	4.80@ 4.90	4.85@ 4.95	4.80@ 4.90
Stove	5.25	4.90	4.95	4.90 .....
Chestnut	5.50	5.05@ 5.15	5.10@ 5.20	5.05@ 5.15
Pea	3.50	3.25@ 3.45	3.30@ 3.50	3.25@ 3.45
Buckwheat	2.75	2.10@ 2.45	2.50@ 2.75	2.10@ 2.45
Rice	2.25	1.75@ 1.95	2.25	1.75@ 1.95
Barley	1.75	1.30@ 1.70	1.75	1.30@ 1.70

PHILADELPHIA, PENN.

Local trade sluggish, but the Western and New England consumption is absorbing the surpluses. Steam grades in fair demand except pea, which is flat. Considerable interest in the new anthracite tax. Bituminous is strong.

The second week of partial suspension of operations at the mines finds the trade absorbing practically all of the output. While the local business still continues sluggish, the demand from the New England territory and the far West is taking care of what surplus there is. This, of course, applies to the prepared sizes. The steam-coal market, outside of pea coal, is in fairly good condition, although the movement of these sizes is undoubtedly on contracts; for pea there is practically no demand at all, and it is understood that most of the production is going into stock.

The attitude of the dealers has not changed to any extent regarding the new state tax, but most of them have signified their intention of submitting to the inevitable. The most complaints seem to come from consumers outside of the state, who are undoubtedly justified in taking the stand that they are not interested in the State of Pennsylvania to the extent of paying its taxes. Threats of suits to determine the constitutionality of the tax are heard from all sides. In event of the law being declared illegal the question arises, will the companies refund the taxes to the dealers, and the householders will be just as curious to know if what they pay the retailer will be refunded to them.

The bituminous market still continues to enjoy its meed of prosperity. Considering the many disturbing elements during the past two or three weeks, the market has held its own in a remarkable manner, there being no unusual advancing of prices and no feverish demand. As a matter of fact, high-priced coals are moving off promptly, and the low-priced varieties are sold before leaving the mines. There is little free coal in the market, and buyers are complaining about delayed deliveries, which is probably due to the fact that the coal is being diverted to better markets, or on sales that will net the operator more money. The Tidewater ports are handling an immense tonnage, and the outlook is favorable for the balance of the summer months.

PITTSBURGH, PENN.

Abnormal production of slack, due to heavy lake shipments is better absorbed than usual. Prices generally being well maintained but no premiums are reported. The deadlock in Connellsville coke continues, but may be broken by the financial troubles in Pittsburgh.

Bituminous—Car supply has been better the past week, the decrease in mining the preceding week because of the holiday giving the railroads a chance to catch up. Line demand has been somewhat less on account of stock taking and closing for repairs among consumers. Prices are held without difficulty, but premiums are practically absent. The production of slack is being absorbed better this year than in any previous years, despite the largeness of lake shipments, and on most roads there is practically none to be had at under the regular season figure of 90c. On the Pan Handle there is a little to be picked up occasionally at 70@75c. We continue to quote regular prices as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh Distict.

Connellsville Coke—The market has been ominously quiet during the past week. There was about 175,000 tons a month of furnace coke involved in contracts expiring June 30, operators having demanded $2.50 for their renewal without avail until at the close of June a compromise was reached in several cases, resulting in the sale of about 90,000 tons of coke for July only at $2.50, this price being, in the great majority of cases, guaranteed against decline. It seemed probable that the remaining tonnage would be rounded up by the operators at their price, but complications developed. On Saturday, July 5, several furnaces tried to buy prompt coke, but did not satisfy their demands. Some might have paid $3 on the spur of the moment, but as the coke was not to be had they withdrew entirely. Four of five merchant furnaces have been banked, practically going on strike against the market.

The failure of J. S. & W. S. Kuhn, Incorporated, and the First-Second National Bank, in which they were interested, at the beginning of last week, has introduced fresh complications. The Kuhn Co. controlled the Isabella Connellsville Coke Co., which has gone into a receivership, while two or three coke companies were so tied up with the bank, through receiving commercial accommodations, largely with their bonds as collateral, that some other coke receiverships are not impossible. Buyers are encouraged to hold off, since receivers might not be disposed to adhere to the $2.50 price, and a break in the market is quite possible. Foundry coke has been firm, with a moderate movement on contract. We quote: Prompt furnace, $2.50; contract furnace, $2.50; prompt foundry, $2.85@3; contract foundry, $2.85@3 per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended July 5, at 333,358 tons, a decrease of 76,641 tons, and shipments at 9665 cars, a decrease of 2316 cars. The great decrease in the week was due to the holiday falling on Friday, little work being done the succeeding day. It is believed that in the past week there has been definite restriction of output by some operators, due to contracts not having been closed.

BALTIMORE, MD.

Trade holding remarkable firm in view of depressed business conditions. Prices stiffening and slack the only weak branch. Water shipments light for the week, but average for the month will be heavy.

The coal trade here is holding up remarkably well under existing circumstances. This is ordinarily the dull summer period and besides business and financial conditions are more or less unsettled. However, should the business uncertainty continue, coal men say it will undoubtedly create a feeling of uneasiness in the trade.

West Virginia three-quarter is in remarkable demand, large quantities being rushed to the lakes, and prices stiffening up from the 90c.@$1 quotations of a week ago to $1@1.05 at present. At the same time the large output of slack with but moderate orders has caused that grade to drop as low as 50@55c. at the mines. Outside of slack, even the cheap grade of coals are holding steady and are in healthy demand. Pennsylvania steam fuels are showing no signs of shading off.

The movement to the piers here continues heavy; this is almost exclusively contract fuel for either coastwise or foreign loading, and it is rare that large free tonnages are found. Not as many foreign charters were announced for the past week, but enough have been engaged to insure a heavy movement throughout the present month.

BUFFALO, N. Y.

Bituminous producers refusing to contract far in the future. Car shortage anticipated in 30 days when the crop movement opens up. Some indication of improvement in coke. Local hard coal dull, but Lake movement still heavy.

It is generally agreed that the bituminous market is growing stronger and some dealers are reporting higher prices. One sale of 50 cars is reported, half at 10c. advance over the price of a month ago for immediate delivery and the other half at 20c. advance for future delivery. The refusal of sellers to bid on contracts for longtime deliveries is becoming more marked of late and shows what the feeling is.

Some dealers have a hard time to get what they want, and in case they are badly tied up with contracts the situation is anything but pleasant. Hereafter all contract figures will be fully up to current prices, with few willing to bid on longtime business. Crops will begin to move liberally within a month which will create a car shortage in addition to the scarcity of men. Nothing but a considerable falling off in consumption will weaken the market, and such is not liable to occur as business is brisk in practically all lines.

Coke is reported stronger, with the soft 48-hr. grades showing a decided improvement in demand. This alone, if it lasts, will add a strength to the entire market that it has long lacked. Coke has been weak all the season, which would indicate that something was the matter with the iron trade, which would naturally cause uncertainty in affiliated lines. Slack coal has not been active for some time, but that trade here is almost entirely governed by the lake conditions, which are not always well understood. If the production of slack that is necessary to a sufficient amount of three-quarter, happens to be excessive, it will remain weak even when sizes are strong, and vice versa.

Bituminous prices are, therefore, quite strong with the exception of slack, which is only moderately so, at $2.90 for Pittsburgh select lump, $2.75 for three-quarter, $2.55 for mine-run and $2.15 for slack, with Allegheny Valley about 25c. lower. Coke is improving, but with prices remaining on about the same level.

The demand for anthracite is light and is not expected to be heavier till the farmers are through moving the crops. Country dealers are often doing actually nothing and obliged to take up other business in order to make sure of an occupation. The city demand is better than that, but it is not at all good, and the rail line coal is moving slowly. Nothing is active but the shipment of anthracite by lake. The smaller ports are quiet, but a large amount is going into the larger ports. For the week the loading has been heavy, aggregating 152,000 tons.

COLUMBUS, OHIO

Demand heavy and prices are showing a strong raising tendency. The Lake movement is large, domestic dealers are stocking to capacity and steam users are demanding good tonnages. The week's production was heavy.

The demand from the Northwest is insistent and the indications are bright for a continuation right up to the close of navigation. Reports from the upper lake docks show that there is no congestion of consequence. Bottoms are being chartered far ahead.

Dealers in all parts of Ohio, Indiana and Michigan are placing orders both for immediate and deferred delivery in preparation for the stocking period, which shows evidence of being earlier than usual. Considerable stir is also seen in school and other public fuel contracts, while the threshing season, which is now at hand, is causing quite a good demand in the rural sections.

Manufacturing establishments are using a large tonnage, and the same is true of railroads. Some of the larger consumers are showing a disposition to stock up to guard against a car famine. Most of the coal men believe that there will be an acute car shortage later in the season, especially when the domestic demand scatters the railroad equipment all over the country.

Production is fairly good in all of the mining districts of the state. This is due to the three holidays of the previous week, which allowed cars to accumulate at the mines. In the eastern Ohio district the output is estimated at 85 per cent. and the same percentage is given from the domestic fields of Jackson, Cambridge and Massillon. In the Hocking Valley, normal production is reported. In the Pomeroy Bend district the output was about 75 per cent. of normal.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.60		$1.60	$1.60
¾ inch	1.45	$1.20	1.40	1.40
Nut	1.25		1.35	
Mine-run	1.25	1.10	1.25	1.20
Nut, pea and slack	0.65		0.65	0.65
Coarse slack	0.55	0.70	0.55	0.55

HAMPTON ROADS, VA.

Many steamers delayed because of shortage of coal. With miners again at work, situation will probably be relieved shortly. Operators well covered and indications are that there will be little free coal for some time. Heavy demand in both foreign and coastwise trade.

Dumpings over the various Hampton Roads piers have been anything but heavy during the past week. This has not been caused by a shortage of vessels, but by the lack of coal. However, toward the end of the week conditions have somewhat improved; contractors have managed to take care of bunker steamers and the shortage has affected them but little. The miners in the New River district having gone back to work, coal is now coming forward to tidewater and it is hoped that the next week will see all piers working under normal conditions and the accumulated vessel tonnage taken care of.

There has been a heavy demand for both coastwise and foreign buyers, but as coal has not been in sight, few quotations have been made for July delivery. All suppliers seem to be booked up for their entire output for the balance of the month and indications are that there will be little free coal at this port for some time to come. Even with the shortage suppliers have managed to take care of several foreign cargoes moving to La Plata, Panama, Talcahuano, Rio de Janeiro and Tampico.

LOUISVILLE, KY.

Summer stocking now up to maximum. Market firm and will probably continue so until consuming season starts.

The surplus in the steam coals has disappeared, due to the restricted production over the Fourth of July, and there is a mild shortage now. The situation was made more acute by the sudden cessation in the heavy shipments of pea and slack from the western Kentucky field. However, this general shortage is probably only a temporary condition and is not a serious trouble.

The summer stocking of domestic grades is now up to maximum, and this department is generally firm all along the line; indications are that this situation will continue without a break until the consuming season starts. Some of the fancy grades of eastern Kentucky block coal have recently sold as high as $2 per ton f.o.b. mine; Straight Creek nut and slack is strong at 70c. with the lower grades, including western Kentucky, at 50@60c., and pea and slack at 30@35c.

INDIANAPOLIS

Indiana production running much higher than usual at this time. Car supply good, but trouble anticipated in fall. The hopper bottom car in Indianapolis.

Indiana mines are averaging about four days a week, which is regarded satisfactory for July, since this is probably the dullest manufacturing month of the year. There is no trouble about cars, but apparently there will be as there is a big corn and wheat crop to move. Prices at the mines and in Indianapolis are unchanged. Retail business is apparently larger than it was last year at this time.

DETROIT, MICH.

Market becoming steadily stronger and railroads are handling the coal well. Orders are mostly for spot delivery. Steam coals particularly strong.

Bituminous—The demand is holding fairly strong considering the hot weather prevailing at this time; this is particularly true of the steam coals, the prices on which are holding quite firm. Most orders are for prompt delivery or for not to exceed 60 days. The railroads are handling the heavy movement in a satisfactory manner, and there is no difficulty in obtaining cars as yet, but it is predicted that the situation in this respect will be quite acute in the fall.

If anything the market is becoming steadily stronger. Smokeless coals are particularly difficult to obtain, and this is diverting a portion of the demand for these grades to anthracite. The local market is quotable on about the following basis:

	W. Va. Splint	Gas	Hocking	Cambridge	No. 8 Ohio	Pocahontas	Jackson Hill
Domestic lump	$1.55	....	$1.50	....	....	$2.25	$2.00
Egg	1.55	....	1.50	....	....	2.25	2.00
Steam lump	1.25	....	....	....	....	....	....
¾-in. lump	1.15	$1.15	1.05	$1.15	$1.15	....	....
Mine-run	1.10	1.10	1.10	1.10	1.10	1.50	....
Slack	0.80	0.85	0.50	0.65	0.65	Open	....

CHICAGO

Eastern coals in sharp demand. Small buying of Western grades has caused prices to sag. Coke more active. Some stocking of bituminous in anticipation of transportation difficulties in the fall.

In view of an expected car shortage, Western dealers are being advised to increase their stocks. With large crops in prospect and the railroads curtailing orders for equipment, it is regarded as certain that they will be unable to meet the demand when the crop movement is in full swing.

So far as Hocking coal is concerned, the market is far from being overstocked. It is estimated that only about one-half of the retailers have as much smokeless coal in storage as ordinarily at this time of the year. As a result of a lack of buying orders for Western coals, lump and egg are selling at the price of steam lump and mine-run. During the past two months, many of the operators in Indiana and Illinois have been running at from 50 to 60 per cent. of capacity. Dullness prevails in the spot market.

An increase in activity has been noted in the coke market. Some contracts for furnace and foundry coke have been closed for the year on the basis of $2.50 at the oven for furnace coke and $3 for foundry. Prevailing prices are:

	Springfield	Franklin Co.	Clinton	W. Va.
Domestic lump	$1.97@2.07	$2.55	$2.27	
Egg		2.55		$3.94@4.20
Steam lump	1.82@1.87		2.07	
Mine-run	1.77@1.82	$2.20@2.30	1.87	3.30
Screenings	1.62@1.67	1.90@1.95	$1.62@1.67	

Coke—Connellsville and Wise County, $5.25@5.50; byproduct egg and stove, $4.85; byproduct, nut, $4.75@4.85; gas house, $4.50@4.60.

ST. LOUIS, MO.

The local market seems to be definitely improving. The Keokuk power it has restricted the demand for screening, but there is a general increase in quotations on other grades. Slack is the only weak branch of the trade.

The St. Louis market has started to improve, especially in regards to prices on coals from the Standard field. With the demand for screenings shut off on account of the Keokuk power coming in, there has been an abundance of these.

The prevailing circular is:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard
2-in. lump	.....	.....	.....	$0.85
3-in. lump	.....	.....	$1.20	.....
6-in. lump	$1.15 @ 1.30	.....	1.25	0.95
Lump and egg	.....	$2.00	.....	.....
No. 1 nut	1.15 @ 1.30	.....	.....	0.90
Screenings	0.75 @ 0.85	.....	0.75	$0.65@0.70
Mine-run	1.10	.....	.....	0.80
No. 1 washed nut	1.50	.....	.....	.....
No. 2 washed nut	1.30	.....	.....	.....
No. 3 washed nut	1.25	.....	.....	.....
No. 4 washed nut	1.15	.....	.....	.....
No. 5 washed nut	0.95	.....	.....	.....

St. Louis prices on July anthracite are: Chestnut, $7.25; stove and egg, $7; grate, $6.75. Smokeless lump and egg are $4.65; byproduct coke, $5.10, and gas-house coke, $4.85.

NEW ORLEANS

River movement of coal to the South will be light. Several tows out of Pittsburgh failed to get through. First high-water stage wil see a heavy shipment.

Prospects for a mid-summer movement of Pennsylvania coal are not bright. Waterfall on the Missouri watershed has been lighter than usual, with the result that dredges are already being used in the Mississippi. Shoal water was reported first from Point Pleasant and the head of Island 26. Several coal fleets, which managed to get away from Pittsburgh failed to get out of the Ohio; the big tow boat "Sprague" got through light and is making use of the time in gathering all empty barges. They will be taken as far up the river as the stage will permit

A fleet of loaded coal barges from the west Kentucky mines is coming down the river towed by the "Reaper."

With the first rise in the Ohio, local agencies expect to receive no less than 3,000,000 bushels.

PRODUCTION AND TRANSPORTATION STATISTICS

The Car Situation

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended June 30, as follows:

	Surplus	Shortage	Net*
New England Lines	189	334	145
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	1,003	692	**311**
Ohio; Indiana; Michigan; Western Pennsylvania	1,422	302	**1,119**
West Virginia, Virginia, North & South Carolina	878	1,111	233
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	300	150	**150**
Iowa, Illinois, Wis., Minn.; North & South Dakota	1,771	161	**1,610**
Montana, Wyoming, Nebraska	118	0	**118**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	2,423	61	**2,362**
Texas, Louisiana, New Mexico	342	4	**338**
Oregon, Idaho, California, Arizona	2,609	6	**2,603**
Canadian Lines	0	0	0
Totals	11,055	2,821	**8,234**
Greatest surplus in 1912 (Apr. 25)	94,692	2,144	**92,548**
Greatest shortage in 1912 (Oct. 10)	6,491	14,897	8,406

***Bold face** type indicate a surplus.

LAKE SHIPMENTS

Anthracite Shipments through the Sault canals for the current year to July 1 were 1,004,028 tons as compared with 224,908 tons for the same period last year.

Bituminous Shipments for the same periods were: 5,492,091 for the current year as compared with 3,715,397 in 1912 making gross of 6,496,119 for 1913 and 3,940,305 in 1912.

SOUTHWESTERN TONNAGE

The following is a comparative statement of the Southwestern tonnage for April and May and the first four and five months of the years 1912 and 1913:

State	April 1912	April 1913	Four Months 1912	Four Months 1913
Missouri	189,751	204,255	1,142,277	1,047,445
Kansas	303,216	444,142	1,928,482	1,848,869
Arkansas	95,994	136,153	714,884	587,590
Oklahoma	164,270	246,155	1,092,475	1,155,467
Totals	753,231	1,030,705	4,878,118	4,639,371

State	May 1912	May 1913	Five Months 1912	Five Months 1913
Missouri	194,505	186,366	1,336,782	1,233,811
Kansas	254,924	407,124	2,183,406	2,255,993
Arkansas	103,647	130,020	818,531	717,610
Oklahoma	131,220	252,901	1,223,695	1,408,368
Totals	684,296	976,411	5,562,414	5,615,782

CHESAPEAKE & OHIO RY.

The following is a comparative statement of the coal and coke traffic over the lines of the C. & O. Ry., for May, and the eleven months ending May 30, 1912-13, in short tons:

Destination	May 1913	May 1912	11 Months 1913	%	11 Months 1912	%
Tidewater	284,109	391,699	3,277,754	23	4,017,374	25
East	155,872	151,952	2,357,236	17	2,012,940	12
West	908,536	893,581	8,153,781	56	10,031,074	62
Total	1,348,517	1,437,232	13,788,771		16,061,388	
Coke	29,438	25,167	285,457		215,707	
From connections						
Bituminous	101,854	13,661	638,124	4	198,125	1
Anthracite	2,638	364	13,952		33,555	
Grand total (except coke)	1,453,009	1,451,257	14,440,847	100	16,293,068	100

ANTHRACITE SHIPMENTS

The following is comparative statement of the anthracite shipments for June and the first six months, of the years 1912-13, in long tons:

	June 1913	June 1912	6 Months 1913	%	6 Months 1912	%
Phila. & Reading	1,155,107	1,166,670	6,858,384	19.68	5,261,335	20.16
Lehigh Valley	1,183,821	1,175,688	6,592,131	18.91	4,712,666	18.06
Cent. R.R. N.J.	851,445	850,788	4,575,664	13.13	3,372,090	12.92
Del. Lack. & West	872,714	836,365	4,789,360	13.74	3,717,584	14.25
Del. & Hudson	568,352	670,331	3,504,539	10.05	2,573,212	9.86
Pennsylvania	510,341	555,674	3,167,106	9.09	2,354,891	9.02
Erie	661,892	708,906	4,079,792	11.71	3,167,540	12.14
Ont. & Western	211,375	227,224	1,284,878	3.69	937,661	3.59
Total	5,970,047	6,191,646	34,851,854	.....	26,096,979	.....

Stocks at Tidewater at the close of June were 533,029 tons as compared with 502,629 the month before.

COAL SECURITIES

The following table gives the range of various active coal securities during the week ending July 12:

Stocks	Week's Range High	Week's Range Low	Week's Range Last	Year's Range High	Year's Range Low
American Coal Products	87	87	87	87	87
American Coal Products Pref	109½	109½	109½	109½	109½
Colorado Fuel & Iron	....	....	28	41½	24½
Colorado Fuel & Iron Pref	....	....	155	155	150
Consolidation Coal of Maryland	102½	102½	102½	102½	102½
Lehigh Valley Coal Sales	225	210	215	....	....
Island Creek Coal Com	49	48	49	....	....
Island Creek Coal Pref	79½	79	79	....	....
Pittsburgh Coal	....	....	15⅞	24½	14½
Pittsburgh Coal Pref	76	74½	76	95	73
Pond Creek	17¼	16½	17	23⅜	16½
Reading	157¼	155½	157½	168⅞	151⅛
Reading 1st Pref	....	....	86	92½	86
Reading 2nd Pref	86	86	86	95	84
Virginia Iron, Coal & Coke	....	....	40	54	37½

Bonds	Closing Bid	Closing Asked	Week's Range or Last Sale		Year's Range	
Colo. F. & I. gen. s.f.g. 5s	93½	96	93⅝	June '13	93⅛	99½
Colo. F. & I. gen. 6s	..	..	107½	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	79¾	Sale	79¾	79¾	77½	85
Cons. Ind. Coal Me. 1st 5s	..	..	85	June '11	..	..
Cons. Coal 1st and ref. 5s	..	92½	93	Oct. '12	..	..
Gr. Riv. Coal & C. 1st g 6s	..	100	102½	April '06	..	..
K. & H. C. & C. 1st s f g 5s	..	96	98	Jan. '13	98	98
Pocah. Con. Coll. 1st s f 5s	..	86	86½	June '13	86	87½
St. L. Rky. Mt. & Pac. 1st 5s	73	74	76	June '13	76	80
Tenn. Coal gen. 5s	99½	99⅞	99⅞	99⅞	99½	103
Birm. Div. 1st consol. 6s	100½	102½	101	April '13	101	103
Tenn. Div. 1st g 6s	100	100½	102	Feb. '13	102	102
Cah. C. M. Co. 1st g 6s	..	103	110	Jan. '09	..	..
Utah Fuel 1st g 5s	..	..	..	..	..	..
Victor Fuel 1st s f 5s	..	80	80	May '13	79½	80
Va. I. Coal & Coke 1st g 5s	92	97	92	June '13	92	98

DIVIDENDS

Consolidation Coal Co.—Regular quarterly dividend of 1½% payable July 31 to holders of record July 23.

Pacific Coast Co.—Regular quarterly dividend of 1½% on both the common and the second preferred and 1¼% on the first preferred, all payable Aug. 1 to holders of record July 19 to Aug. 1.

COAL TRADE NEWS

The Hard Coalers Slowing Up—The Philadelphia & Reading Coal & Iron Company's mines will work only four days per week during the balance of the month; the Susquehanna Coal Co. will restrict operations to three days per week; the Lehigh Valley Coal Co. will work on a basis of five days per week; the Lehigh Coal & Navigation Co. will work four days per week during the balance of the month.

PRICES OF MINING SUPPLIES

THE MARKET IN GENERAL

The slowing down of business in all sections of the country seems imminent, and manufacturers state that industrial inactivity has already manifested itself in many ways. There is a tendency on the part of all classes of manufacturers to go very slowly in the construction of new plants, and the acquisition of existing ones is either held up entirely, or is the subject of careful deliberation.

The volume of business has not slackened to any large extent as is seen by the orders being received by the largest steel makers, which are now running at the rate of 23,000 tons a day, compared with the maximum capacity of approximately 38,000 tons daily. On the other hand, this interest has, at times, booked as high as 70,000 tons daily, spread over an entire month.

The financial situation is the real cause of the business trouble and the higher rates demanded for money by bankers, both in the United States and abroad, is causing a great deal of curtailment, and will probably result in the stopping of much work. Some of the leading railroads of the country and industrial concerns with extremely high credit have recently borrowed, and paid as much as 7% for their money for short periods. There is not enough profit in business to induce large manufacturers to pay such rates of interest with the hope of making anything on it.

Business is largely tied up with the political situation, while the inability of Congress to settle the tariff and the Currency Bill has had a bad effect on the situation.

LABOR

Strikes have been less frequent, and there is not so much dissatisfaction as there was in May. There continues to be trouble among the miners in West Virginia. A part of the building trade in Chicago is tied up, and the strike of the weavers and dyers at Paterson continues, more or less, although it has been gradually weakening for the last six weeks. In New England, there have been serious differences between capital and labor in certain of the mills around Boston. The attempt of the U. S. Secretary of Labor to settle some of these strikes will be watched with much interest.

The trainmen on 48 railroads operating east of the Mississippi have voted a strike, unless increase in wages is granted. There has been a refusal to arbitrate the differences under the Erdman Act and there is a possibility of a serious strike. On the other hand, it is not generally believed that the trainmen will leave their jobs at this time when there is a manifest lessening in the amount of traffic.

Laborers for general contract work in New York and vicinity are more plentiful than last year, but good outside labor commands $2 per day, and there seems to be likelihood of this rate being diminished during the present year at least.

IRON AND STEEL PRODUCTS

The unfilled orders of the United States Steel Corporation during the months of May and June decreased more than 1,000,000 tons. Since the first of the year they have declined 2,000,000 tons. In spite of this fact, the unfilled orders at the end of June were larger, with only three exceptions, than any other year since the organization of the corporation in 1902.

The unfilled orders will undoubtedly continue to decrease slightly for two, if not three, months longer. By that time there should be enough information to foretell whether a protracted spell of dull business is in sight or the turning point has been reached. The mills have not, as yet, curtailed their operations to any large extent, but they will do so, should the volume of orders decrease much more, and especially if they do not receive prompt shipping instructions.

Railroads are practically out of the market as far as buying any kind of materials is concerned, and likewise, the larger industrial companies are waiting until more information regarding the future is at hand. Quite a little activity is noted in the demand for pipe, and the automobile manufacturers continue to take large quantities of all kinds of materials.

Steel Rails—Business continues to slow down, and there has been very little activity in rails of standard sections, although about 100,000 tons were sold during June. In light rails, the falling off is just as marked, and in a few months the rail mills will have finished their schedules of operation. Before that time, however, it is probable that new orders will be received.

Quotations are unchanged at $1.25 per lb. per standard section, weighing from 50 to 100 lb. per yd.; $1.21 for 40- to 50 lb. rails; $1.30 for 16- to 20-lb. rails. These quotations are per 100 lb. for car-load lots f.o.b. Pittsburgh.

In Chicago, 16- to 20-lb. rails are $1.30; 12-lb., $1.333; 8-lb., $1.40. Relaying rails are sold $24 per gross ton in Chicago, and in New York at $22.50. These quotations can likewise be obtained at other points.

Track Supplies—Business has again fallen off, and is now almost nominal. With the reduction in the volume of business came a contraction of prices. Railroad spikes are now quoted at $1.80, Pittsburgh. Track bolts with square nuts, $2.30@2.40. These prices are per 100 lb. Tie plates are $33@35 per net ton. Quotations in Pittsburgh are likewise easier; railroad spikes are quoted at $1.70@1.75 for the large size and $1.80@1.85 for a small size.

Pipes—Business in the pipe trade is most satisfactory compared with the other iron and steel markets. Several makers in and around the Pittsburgh district report more business received during June than any other month of the year. There is a foreign inquiry in the market for approximately 700 miles of 8-in. pipe, and the National Tube Co. has booked an order for 110 miles of the same size. For pipe used by oil companies in particular there is an exceedingly great demand, and in some instances premiums have been paid over regular prices for prompt delivery. A revision in discount has been made, and net prices are approximately 5% higher than they were last month.

Discounts and net prices are as follows:

	Black	Galvanized
¾- to 2-in. steel butt welded	79%	70½%
2½- to 6-in. steel lap welded	78%	69½%
7- to 12-in. steel lap welded	75%	64½%

At these discounts the net prices of pipe per foot at Pittsburgh are as follows:

Diameter	Cents Black	Cents Galvanized	Diameter	Cents Black	Cents Galvanized
¾-in	2.43	3.40	5-in	30.50	45.00
1-in	3.58	5.00	6-in	42.25	58.25
1¼-in	4.85	6.80	7-in	59.50	85.00
1½-in	5.80	8.10	8-in	62.50	89.00
2½-in	12.90	17.80	10-in	$1.03	$1.46
3-in	16.80	23.30	11-in	1.13	1.64
4-in	23.90	33.20	12-in	1.27	1.82

Sheets—Continued weakness has prevailed in the sheet market, and early in June the price of 27 galvanized in large lots, Pittsburgh, declined 5c. per 100 lb. to $2.25. At that time there was quite a fair business transacted at these prices, and the mills placed a number of orders on their books for future delivery. Since then, efforts have been made to secure galvanized sheets at $3.25, but in many instances mills have refused to accept these quotations except for fourth-quarter delivery. The reason for this is that their order books have been filled with enough third-quarter business to keep their mills very actively engaged, and for the slight additional capacity they have, there was no need of cutting the quotations. There is no doubt that numerous mills would be very willing to accept $3.25 for fourth-quarter.

The following quotations are for lots of a few bundles each, f.o.b. Pittsburgh and Chicago. Price for large lots is as stated, $2.25 f.o.b. Pittsburgh for No. 28 base.

	Cents per pound Pittsburgh Black	Pittsburgh Galv.	Chicago Black	Chicago Galv.
Nos. 22 and 24	2.70	3.50	2.65	3.45
Nos. 25 and 26	2.75	3.65	2.70	3.60
No. 27	2.80	3.90	2.75	3.85
No. 28	2.85	3.95	2.80	3.90

Structural Materials—There is a dearth of business in the East, principally because building operations cannot be financed on any reasonable terms. In the West, the railways are curtailing their orders for bridges and structural material for similar reasons, it being almost impossible to secure funds to pay for these improvements. How long such a condition will last is only a matter of conjecture, but in the

meantime, structural mills are working on old orders, and have very little new business. Some extremely low prices have been made for fabricated work, and it is probable that mine improvements can be carried on more cheaply now than at any time in several years.

Quotations for structural steel bars are unchanged and plates, beams and angles being held at $1.50 base Pittsburgh. Chicago price is $1.68@1.73. These prices are per pound in carload lots.

Spiral Riveted Pipe—Prices are without change. The following quotations are f.o.b. factory, freight equalized with New York, being figured at a discount of 50, 10 and 10% from list. These are for orders amounting to approximately $250. For large orders, prices are cheaper by 12½ to 20½.

Diameter in in.	Thickness Birmingham wire gage	Net price per 100 ft. With bolted joints complete: Plain	Asphalted	Galvanized
4	18	$19.76	$21.48	$30.74
5	18	23.40	23.70	37.14
6	16	33.05	35.76	49.73
7	16	37.58	40.76	56.82
8	16	43.17	46.80	65.00
9	16	50.06	50.10	74.22
10	14	66.42	71.08	96.15
11	14	71.20	76.57	102.24
12	14	83.75	89.15	118.30

Pig Iron—Curtailment in the output of pig iron has not been as drastic as was expected late in the spring, and in point of fact, prices have declined faster than production. The daily rate of pig-iron manufacture in June was over 87,000 tons, which is smaller than any month since October of last year, but it is a difference of only a few figures for the high record established in February was only 92,300 tons daily. For the last 19 months the pig-iron production of the country has exceeded 2,000,000 tons monthly. The make in June was 2,600,000 tons compared with 1,045,000 tons, the low point, in January, 1908. It is believed that production will show a further falling off of from 5% to 10% this month, for already several furnaces have been banked, and the high price of coke is having an influence, for there is little profit in making iron to sell at $14 with coke costing $2.50. Consumers have been buying iron only sparingly, although some fair-sized lots have been disposed of to manufacturers of cast-iron pipe and the malleable foundries in the East. Prices are down $2 to $3 below what they were in November and December, and as low as $10 has been accepted for No. 2 Southern Foundry at Birmingham.

WIRE PRODUCTS

Wire—The only orders received by manufacturers of wire and wire products are from jobbers and consumers who need material for immediate requirements. There is little or no incentive to buy for forward delivery, as prices have apparently reached their maximum, and in some cases are lower. In Pittsburgh, there has been a decline of $1 per ton on annealed fence wire. Annealed fence wire in large lots can be had at $1.55. Galvanized barbed wire at $2.20, annealed is $1.80. These quotations are f.o.b. Pittsburgh. In Chicago No. 9 plain wire is $1.78; painted barbed wire $1.98, and galvanized $2.38.

Wire Rope—The demand is less than last month. Quotations are as follows: Two-inch rope, Pittsburgh, 50c. per lin.ft.; 1¼-in., 23c.; ¾-in., 10c. These quotations are for the best grade of rope, and cheaper grades can be had at considerable concessions from these figures.

Copper Wire—There has been a distinct falling off in the volume of business and prices are very much unsettled. Some quotations are 17c. per lb., but it is probable that a desirable order for large amounts could be placed at much less than this figure. The one redeeming feature in the wire trade is the proposition to electrify several important trunk lines in the West.

HARDWARE

Nails—The nominal asking price of nails continues unchanged, at $1.80 Pittsburgh and $2.10 New York. This price is not a reflection of market conditions, except in so far as it portrays the dullness at Pittsburgh and the inability to secure orders even if concessions were made. For small lots in jobber's store, 2c. is named at Pittsburgh and 2.20c. at Chicago; approximately the same prices may be obtained in important jobbing centers throughout the Middle West as at Chicago.

Bar Iron and Steel—Prices are much better than the casual observer would think, in comparison with the small amount of business being transacted at the mills. This is easily explained, because consumers are now buying from store in New York in comparatively small lots, in preference to loading up with material at the mills, which may be considerably cheaper before it is used. Quotations from store are as follows:

	Per lb.
Refined iron:	
1 to 1⅞ in., round and square	2.10c.
1½ to 4 in. x ⅜ to 1 in.	2.10c.
1½ to 4 in. x ¼ in. to $\frac{5}{16}$ in.	2.30c.
Norway bars	3.60c.
Soft steel:	
¾ to 3 in., round and square	2.05c.
1 to 6 in. x ⅜ to 1 in.	2.05c.
1 to 6 in. x ¼ and $\frac{5}{16}$ in.	2.20c.
Rods—⅝ and ½ in.	2.15c.
Bands—1½ to 6 $\frac{5}{16}$ in. to No. 8	2.35c.
Beams and channels—3 to 15 in.	2.15c.
Extras for triple B (BBB)	
$\frac{3}{16}$ and ¼ in.	2c.
$\frac{5}{16}$ and larger	1.75c.

Chain—There is less demand than a month ago. Ruling quotations per 100 lb., f.o.b. Pittsburgh, are as follows:

$\frac{3}{16}$ in.	$7.50
¼ in.	4.95
$\frac{5}{16}$ in.	3.95
⅜ in.	3.40
$\frac{7}{16}$ in.	3.20
½ and $\frac{9}{16}$ in.	3.00
⅝ and ¾ in.	2.90
$\frac{13}{16}$ and ⅞ in.	2.80
⅞ and 1 in.	2.70
1 to 1¼ in.	2.60
Extras for BB	
$\frac{3}{16}$ in.	1.50
¼ in.	1.50
$\frac{5}{16}$ and larger	1.25

METALS

Copper—Less copper was bought in June than in previous months of the year, but as consumers continue to take fair quantities on contracts made some time ago, and, principally because an important refinery in the East was closed down, the statistical position showed an improvement, and the stocks remaining at the end of the month were smaller than any other month this year. This, however, had no effect on quotations, so prices continue to melt away slowly but steadily. Producers' agents made no open effort to sell below 14¾c., but jobbers who frequently acted for selling agents were willing to make sales at 14⅜c. for electrolytic. European consumers are not buying anywhere near as much as they were a year ago.

Tin—Not since the present boom in tin started in the early part of 1911, have prices been as low as they now are. The London market steadily declined throughout the month and sales were made at around 39c. per lb. This is a very drastic decline, representing a reduction price of 13@14c. in the high figures and fully 25%. Whether the tin market will return to a level of around 30 to 40c., as has been the case for a number of years, is only a matter of conjecture, but from the statistical position there seems to be no good reason why such prices should continue for any length of time.

MISCELLANEOUS

Portland Cement—Manufacturers of portland cement have enough orders on their books to keep them running well into September of this year. At the same time there is very little business being transacted for forward delivery and it would not be at all surprising if a revision of prices were made in the fall. The reason for this has been the sharp falling off of contract work all over the country. Municipalities are not doing anywhere near the amount of contracting work they were two years ago, due to inability to finance the operations. Similar conditions prevent railways increasing their facilities and it seems likely that there will be less cement used in the last half of 1913 than was in the corresponding period of 1912.

Prices show no change; in Pittsburgh, the price is 90c.@$1; in Chicago, $1.10@1.20; in the Lehigh Valley district, 95c.@$1. All these prices are in bulk at the mill, and general consumers have to pay 40c. per bbl. for the package and also freight to destination, making a price to Pittsburgh of $1.58, and one in New York of $1.58. The allowance for bags returned varies from 7½ to 10c.

Bars, Concrete Reinforcing—Consumers of bars are specifying freely on old contracts, but are not entering new ones. Quotations for small lots from Pittsburgh warehouses are as follows:

PITTSBURG, CENTS PER POUND

	Warehouse Stock
¾-in.	2.00@2.10
⅝-in.	2.05@2.15
½-in.	2.10@1.20
⅜-in.	2.25@2.35